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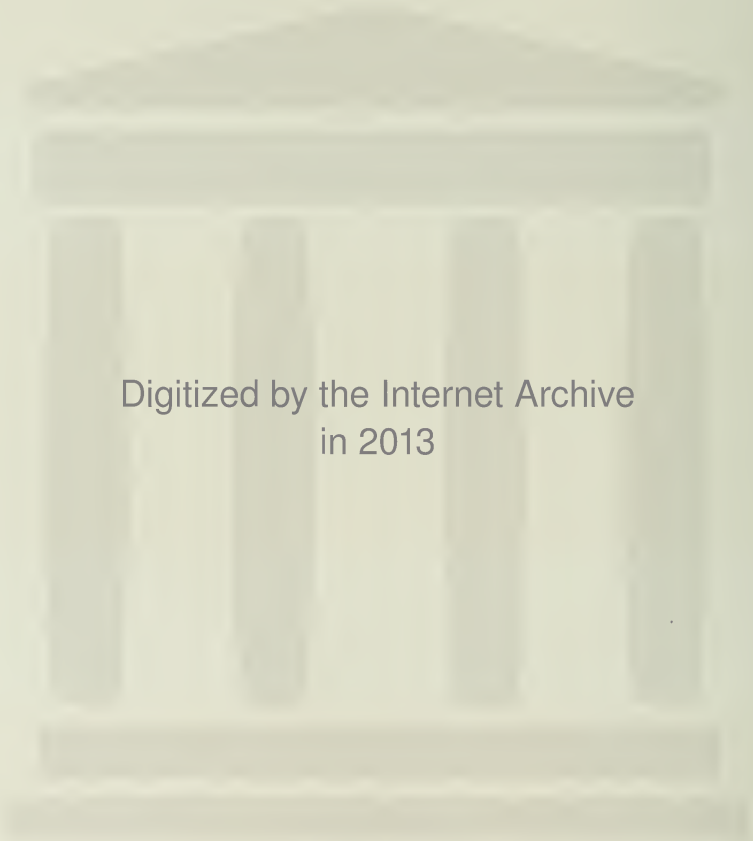
DENTISTRY

UNIVERSITY OF ILLINOIS CHICAGO PROFESSIONAL COLLEGES

MEDICINE

1953-55 GRADUATE COLLEGE CATALOG

PHARMACY



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CHICAGO PROFESSIONAL COLLEGES
University of Illinois

GRADUATE COLLEGE CATALOG

DENTISTRY
MEDICINE
PHARMACY

1953-55

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M. SMITH

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CALENDAR

Information and forms can be secured at the office of the Graduate College, 383 Dentistry-Medicine-Pharmacy Building.

1953 — FALL QUARTER

- September 28, Monday Registration.
September 30, Wednesday Latest date for registration of former students without penalty.
September 30, Wednesday Latest date to apply for French and German examinations.
Oct. 12, Monday Latest date for change in course of study without fee.
October 16, Friday Language examinations.
October 16, Friday Latest date for completion of health examinations of new students.
October 23, Friday Latest date for preliminary examinations for Ph.D. degree (for full residence).
November 7, Saturday Courses dropped after this date will be given a grade of "E".
November 26, Thursday Thanksgiving Day.
December 19, Saturday Fall quarter ends.

1954 — WINTER QUARTER

- January 4, Monday Registration.
January 6, Wednesday Latest date for registration of former students without penalty.
January 6, Wednesday Latest date to apply for French and German examinations.
January 18, Monday Latest date for change in course of study without fee.
January 22, Friday Language examinations.
January 22, Friday Latest date for completion of health examinations of new students.
February 13, Saturday Courses dropped after this date will be given a grade of "E".
March 15, Monday Latest date to apply for Graduate College fellowships for 1954-1955.
March 27, Saturday Winter quarter ends.

1954 — SPRING QUARTER

- April 5, Monday Registration.
April 7, Wednesday Latest date for registration of former students without penalty.
April 7, Wednesday Latest date to apply for French and German examinations.
April 7, Wednesday Latest date to apply for degree to be conferred in June, 1954.
April 19, Monday Latest date for change in course of study without fee.
April 23, Friday Language examinations.

April 23, Friday Latest date for completion of health examinations of new students.

April 30, Friday Latest date for preliminary examinations for Ph.D. degree (for full residence).

May 15, Saturday Courses dropped after this date will be given a grade of "E".

May 21, Friday Latest date for candidates for M.S. or Ph.D. degree in June, 1954, to deposit approved thesis and abstract, file application for degree, and secure clearance slip.

May 31, Monday Memorial Day holiday.

June 4, Friday Latest date for finals for Ph.D. degree in June.

June 4, Friday Latest date for oral examinations for candidates for M.S. degree.

June 18, Friday Commencement.

June 26, Saturday Spring quarter ends.

1954 — SUMMER QUARTER

June 28, Monday Registration.

June 30, Wednesday Latest date for registration of former students without penalty.

June 30, Wednesday Latest date to apply for French and German examinations.

July 5, Monday Independence Day holiday.

July 12, Monday Latest date for change in course of study without fee.

July 16, Friday Language examinations.

July 16, Friday Latest date for completion of health examinations of new students.

August 7, Saturday Courses dropped after this date will be given a grade of "E".

September 6, Monday Labor Day.

September 18, Saturday . . . Summer quarter ends.

1954 — FALL QUARTER

September 27, Monday . . . Registration.

September 29, Wednesday . . Latest date for registration of former students without penalty.

September 29, Wednesday . . Latest date to apply for French and German examinations.

October 11, Monday Latest date for change in course of study without fee.

October 15, Friday Language examinations.

October 15, Friday Latest date for completion of health examinations of new students.

October 22, Friday Latest date for preliminary examinations for Ph.D. degree (for full residence).

November 6, Saturday Courses dropped after this date will be given a grade of "E".

November 25, Thursday . . . Thanksgiving Day.

December 18, Saturday . . . Fall quarter ends.

1955 — WINTER QUARTER

- January 3, Monday Registration.
January 5, Wednesday Latest date for registration of former students without penalty.
January 5, Wednesday Latest date to apply for French and German examinations.
January 17, Monday Latest date for change in course of study without fee.
January 21, Friday Language examinations.
January 21, Friday Latest date for completion of health examinations of new students.
February 12, Saturday Courses dropped after this date will be given a grade of "E".
March 15, Tuesday Latest date to apply for Graduate College fellowships for 1955-1956.
March 26, Saturday Winter quarter ends.

1955 — SPRING QUARTER

- April 4, Monday Registration.
April 6, Wednesday Latest date for registration of former students without penalty.
April 6, Wednesday Latest date to apply for French and German examinations.
April 6, Wednesday Latest date to apply for degree to be conferred in June, 1955.
April 18, Monday Latest date for change in course of study without fee.
April 22, Friday Language examinations.
April 22, Friday Latest date for completion of health examinations of new students.
April 29, Friday Latest date for preliminary examinations for Ph.D. degree (for full residence).
May 14, Saturday Courses dropped after this date will be given a grade of "E".
May 20, Friday Latest date for candidates for M.S. or Ph.D. degree in June, 1955, to deposit approved thesis and abstract, file application for degree, and secure clearance slip.
May 30, Monday Memorial Day.
June 3, Friday Latest date for finals for Ph.D. degree in June.
June 3, Friday Latest date for oral examinations for candidates for M.S. degree.
To be announced Commencement.
June 25, Saturday Spring quarter ends.

1955 — SUMMER QUARTER

- June 27, Monday Registration.
June 29, Wednesday Latest date for registration of former students without penalty.
June 29, Wednesday Latest date to apply for French and German examinations.

July 4, Monday.....Independence Day.
July 11, Monday.....Latest date for change in course of study without fee.
July 15, Friday.....Language examinations.
July 15, Friday.....Latest date for completion of health examinations of
new students.
August 6, Saturday.....Courses dropped after this date will be given a grade
of "E".
September 5, Monday....Labor Day.
September 17, Saturday...Summer quarter ends.

1955 — FALL QUARTER

September 26, Monday. . . . Registration.
September 28, Wednesday. . . . Latest date for registration of former students without penalty.
September 28, Wednesday. . . . Latest date to apply for French and German examinations.
October 10, Monday. Latest date for change in course of study without fee.
October 14, Friday. Language examinations.
October 14, Friday. Latest date for completion of health examinations of new students.
October 21, Friday. Latest date for preliminary examinations for Ph.D. degree (for full residence).
November 5, Saturday. . . . Courses dropped after this date will be given a grade of "E".
November 24, Thursday. . . . Thanksgiving Day.
December 17, Saturday. . . . Fall quarter ends.

1956 — WINTER QUARTER

January 3, Tuesday	Registration.
January 5, Thursday	Latest date for registration of former students without penalty.
January 5, Thursday	Latest date to apply for French and German examinations.
January 16, Monday	Latest date for change in course of study without fee.
January 20, Friday	Language examinations.
January 20, Friday	Latest date for completion of health examinations of new students.
February 11, Saturday	Courses dropped after this date will be given a grade of "E".
March 15, Thursday	Latest date to apply for Graduate College fellowships for 1956-1957.
March 24, Saturday	Winter quarter ends.

1956 — SPRING QUARTER

April 2, Monday Registration.
 April 4, Wednesday Latest date for registration of former students without penalty.
 April 4, Wednesday Latest date to apply for French and German examinations.

April 4, Wednesday	Latest date to apply for degree to be conferred in June, 1956.
April 16, Monday	Latest date for change in course of study without fee.
April 20, Friday	Language examinations.
April 20, Friday	Latest date for completion of health examinations of new students.
April 27, Friday	Latest date for preliminary examinations for Ph.D. degree (for full residence).
May 12, Saturday	Courses dropped after this date will be given a grade of "E".
May 25, Friday	Latest date for candidates for M.S. or Ph.D. degree in June, 1956, to deposit approved thesis and abstract, file application for degree, and secure clearance slip.
May 30, Wednesday	Memorial Day.
June 8, Friday	Latest date for finals for Ph.D. degree in June.
June 8, Friday	Latest date for oral examinations for candidates for M.S. degree.
To be announced	Commencement.
June 23, Saturday	Spring quarter ends.

1956 — SUMMER QUARTER

June 25, Monday	Registration.
June 27, Wednesday	Latest date for registration of former students without penalty.
June 27, Wednesday	Latest date to apply for French and German examinations.
July 4, Wednesday	Independence Day.
July 9, Monday	Latest date for change in course of study without fee.
July 13, Friday	Language examinations.
July 13, Friday	Latest date for completion of health examinations of new students.
August 4, Saturday	Courses dropped after this date will be given a grade of "E".
September 3, Monday	Labor Day.
September 15, Saturday	Summer quarter ends.

1956 — FALL QUARTER

October 1, Monday	Registration.
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NOTES

Registrant is classified as a first-year student until he has completed work toward the M.S. degree and as a second-year student until he has passed the preliminary examination.

Examination in one foreign language (French or German) must be passed before residence in second year may be counted. No foreign language is required of M.S. candidates.

Two copies of the thesis, preferably on thesis paper, are required of all candidates plus two abstracts from each Ph.D. candidate. For special information concerning form of the thesis, paper used, etc., see secretary in Room 383 Dentistry-Medicine-

Pharmacy Building. All original copies become a part of the permanent records at the University of Illinois Library (Urbana); the carbon copy becomes a permanent record deposited with the Library of Medical Sciences (Chicago).

Candidates for master's degree announce thesis subjects at time of registration for the final quarter of work. Petition for change of thesis title must be made to the Associate Dean.

Candidates for Ph.D. degree announce thesis subjects within six weeks after registering for third year in residence. Petition must be made to the Associate Dean to change thesis title.

Assistants or others on full-time appointments are allowed a maximum of one unit of graduate work per quarter; those on half-time may register for two units and proportionately more or less depending on fractional time appointment (see page 25). Students in special cases paid from grants should consult their advisers. Dental and medical students who qualify for graduate work may register for two-thirds unit per quarter. Three units per quarter constitute a full-time graduate program. One unit represents a minimum of thirteen clock hours of laboratory work per week for one quarter.

Registration is required in the quarter in which the student submits his thesis.

Advisers may supplement information contained herein by reference to the Handbook for Advisers of Graduate Students.

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SMISSMAN, EDWARD ERVIN, Ph.D., Assistant Professor of Chemistry

SPELLBERG, MITCHELL ABRAHAM, M.S., M.D., Clinical Associate Professor of Medicine

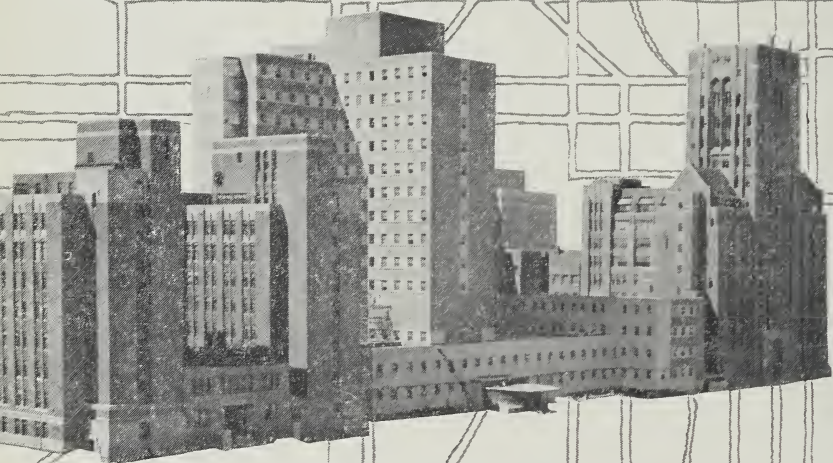
SUGAR, OSCAR, Ph.D., M.D., Assistant Professor of Neurological Surgery

TAYLOR, WELTON IVAN, Ph.D., Assistant Professor of Bacteriology

THOMAS, HENRY BASCOM, B.S., M.D., Professor of Orthopaedic Surgery, *Emeritus*

UNNA, KLAUS ROBERT W., M.D., Professor of Pharmacology
VICHER, EDWARD ERNEST, Ph.D., Assistant Professor of Bacteriology
VOIGT, RALPH FERDINAND, Ph.D., Associate Professor of Pharmacognosy and
Pharmacology
VON BONIN, GERHARDT, M.D., Professor of Anatomy
WAKERLIN, GEORGE EARLE, Ph.D., M.D., Professor of Physiology and Head of the
Department
WEBSTER, GEORGE LEWIS, Ph.G., Ph.D., Professor of Chemistry and Head of the
Department
WEINMANN, JOSEPH PETER, M.D., Professor of Oral Pathology
WELKER, WILLIAM HENRY, Ph.D., D.Sc., Professor of Biological Chemistry,
Emeritus
WHITEHORN, WILLIAM VICTOR, A.B., M.D., Associate Professor of Physiology
WINZLER, RICHARD JOHN, Ph.D., Professor of Biological Chemistry and Head of
the Department
ZIMMERMANN, ARNOLD ALBERT, Dr. ès Sc., Professor of Anatomy

THE GRADUATE COLLEGE



UNIVERSITY OF ILLINOIS

CHICAGO PROFESSIONAL COLLEGES

LOCATION

The Graduate College at the professional colleges of Dentistry, Medicine, and Pharmacy of the University of Illinois is located in the great medical center on the west side of Chicago. The work of the College is centralized in the Dentistry-Medicine-Pharmacy Building facing on Polk, Wood, and Wolcott Streets. The campus, which is about three miles from the "Loop," or main business district of the city, can be reached conveniently by elevated train, street car, or automobile.

The University buildings contain the administrative offices of the College, the library, several museums, many classrooms and large laboratories for class work, numerous small laboratories for individual research, an autopsy amphitheater, a large and well-equipped surgical amphitheater, an auditorium, and the clinics and hospitals. The latter include the Research and Educational Hospitals, the Illinois Surgical Institute for Children, the Neuropsychiatric Institute, and the Institute for Juvenile Research, which are located on the campus. The Illinois Eye and Ear Infirmary is located near the campus. The Institute for Juvenile Research and the Illinois Eye and Ear Infirmary are operated jointly by the University and the Department of Public Welfare. The Chicago Illini Union Building is at 715 South Wood Street.

HISTORY AND ORGANIZATION

The University of Illinois offered facilities for advanced study and research in some fields as early as 1872. Organized graduate instruction under the name of the Graduate School, however, began in 1892. In 1894 the administration of the School was vested in the Council of Administration with the Vice-President of the University as Dean of the School. In 1906 the Graduate School was organized as a separate faculty and in 1947 became known as the Graduate College.

Graduate work at the professional colleges has been in progress since 1924 when the first appointments to the graduate faculty were made. An Associate Dean is responsible to the Dean of the Graduate College for graduate work conducted at the professional colleges. The teaching faculty includes all members of the University faculty who give instruction in approved graduate courses.

College policies pertaining to graduate work in the medical sciences are determined by the Committee for Graduate Work. Recommendations of this committee concerning faculty appointments and approval of courses and curricula in the Graduate College are submitted to the Executive Faculty of the Graduate College at Urbana for approval.

PURPOSE AND STANDARDS

Graduate work in the medical sciences is not intended for individuals seeking brief postgraduate reviews, refresher courses, or demonstrations.



Opportunities for this kind of work are available in the postgraduate curricula offered in certain departments in the professional colleges.

Graduate training is not a matter of successfully completing a number of advanced courses but emphasizes chiefly original laboratory or basic investigation. A major requirement for both the Master of Science and Doctor of Philosophy degrees is a thesis based on a research problem. Students must devote at least one-half of their time to the thesis. Degrees are granted to students (1) whose level of scholarship and investigative endeavor proves that they have mastered a definite field of knowledge and recognize its potentialities and opportunities for further advances, (2) who are able to integrate this knowledge with related domains of fact and understanding, and (3) who have proved themselves as independent and original scholarly investigators. The program, which is primarily one of training for research and teaching in the medical sciences, is entirely distinct from postgraduate training in the medical specialties.

High standards of admission are maintained, and careful selection and individual approval of faculty members is made to supply qualified advisers to graduate students. Laboratory, clinical, and library facilities are superior. Rigid tests in courses and examinations showing evidence of ability for productive research are requirements for normal progress toward a graduate degree.

LIBRARY

The Library of Medical Sciences at the Chicago Professional Colleges ranks as one of the largest university medical libraries in the United States with a total of 110,000 volumes, of which two-thirds are bound periodicals. The library now receives 1,100 current periodicals. The book collection is on open shelves, and there are no restrictions concerning the use of the stacks. The library is used not only by staff members and students of the University, but also by other medical schools, hospitals, and professional men and women throughout the Chicago area. Interlibrary Loan Service permits extensive loan service with other libraries in the country and is of great value to the research worker.

Reference collections in the library include the important American and English encyclopedic works; German *Handbücher* for most of the medical fields; scientific and technical language dictionaries; periodicals covering not only medicine, dentistry, and pharmacy, but allied sciences as well; indexes; sets of abstracts; and pharmacopoeias, both American and foreign.

MUSEUMS

The College of Dentistry has a museum of dental anatomy and comparative odontology containing 1,500 specimens.

The College of Medicine has the Anatomy Museum, including gross anatomy, histology, embryology, and neurology, and the Pathology Museum, including general, special, and medico-legal specimens.

The College of Pharmacy has a museum including more than 10,000 specimens of crude drugs and technical products. One collection is classified according to botanical origin and is arranged in cases illustrating habitat, commerce, etc. Another collection contains every drug officially listed in the *United States Pharmacopoeia* since 1820 and in the *National Formulary* since 1888.

RECREATIONAL FACILITIES

The social and recreational center for students, alumni, and faculty members is the Chicago Illini Union Building, 715 South Wood Street. Its facilities include a cafeteria, grill, soda fountain, browsing room, music room, gymnasium, meeting rooms, and game rooms. Intramural sports under a trained director are encouraged, and facilities and equipment are available for softball, touch football, horseshoes, tennis, archery, wrestling, fencing, badminton, basketball, handball, and ping-pong.

HOSPITAL FACILITIES FOR RESEARCH

The Research and Educational Hospitals, planned and built for teaching and investigation, with 400 beds, connect directly with the classrooms and laboratories of the College. Construction of a new addition of 410 beds was completed in 1953 and is being equipped and occupied. Each year more than 6,000 patients are admitted. The outpatient department consists of twenty-three specialized clinics and annually handles over 175,000 patient visits. There are seven surgical operating rooms, all with facilities for students, including a large amphitheater, seating nearly 200, completely equipped for all types of surgery. There is also a well-equipped cancer clinic with a 400,000-volt therapeutic X-ray machine and an adequate supply of radium. The entire hospital is constantly in use for teaching and research.

The Illinois Surgical Institute for Children has beds for 118 patients. The Neuropsychiatric Institute, with 100 beds, has two separate divisions, one for neurological and one for psychiatric cases.

Provision has been made for teaching in all sections, including outpatient service, wards, and a combination operating and lecture room. Extensive research facilities are also provided.

The Presbyterian Hospital, a neighboring institution with 450 beds, affiliated with the University of Illinois in 1941. Members of its staff, who formerly were on the staff of Rush Medical College of the University of Chicago, are members of the faculty of the College of Medicine. Under an agreement made in 1950, Grant Hospital also affiliated with the University.

The Illinois Eye and Ear Infirmary, with 120 beds, has extensive facilities which are used primarily in specialty and graduate training.

The Division of Services for Crippled Children is an independent unit of the University operating a state-wide program of medical, surgical, and

corrective treatment, as well as services and facilities for diagnosis, hospitalization, and aftercare for children who are crippled or who are suffering from conditions which lead to crippling.

ADMISSION

True graduate education is predominantly an intellectual adventure and has as its chief objective the encouragement of advanced intellectual achievement in the form of productive scholarship and research. Those chiefly interested in technical or advanced professional training will find no place in the Graduate College. Graduate degrees are not granted for technical proficiency nor for purely clinical work. Only highly qualified applicants with demonstrated scholarship and imagination are admitted.

The graduate program is intended primarily for students who have received their professional degrees in medicine, dentistry, or pharmacy. However, superior students registered in a professional college curriculum may be accepted on a highly selective basis. Students who have a bachelor's degree with a major in biological science or chemistry or whose undergraduate training includes organic chemistry, biology, and physics may be admitted. A Bachelor of Science degree in pharmacy is required in pharmacy disciplines. Applicants should demonstrate a desire for graduate training in the basic medical sciences and should expect to make teaching and research in one of these branches a lifetime endeavor.

Admission to the Graduate College is granted to graduates of institutions whose requirements for the professional or bachelor's degree are substantially equivalent to those of the University of Illinois.

Each applicant must submit with his application for admission an official transcript of his college record and letters of recommendation from those who are acquainted with his previous academic record. In order to qualify for admission an applicant must have a scholastic average of at least 3.5¹ or its equivalent in his undergraduate work. For medical or dental students the average is based on both the preprofessional and professional record. After evaluation of all credentials, final acceptance is determined by the head of the department, who notifies the student and assigns him to an adviser. Neither admission to the Graduate College nor the mere accumulation of credits and grades admits a student to candidacy for an advanced degree. Initial registration is dependent on passing a physical examination conducted by the University Health Service. Admission may be on special status which may be terminated at any time if the progress of the student is unsatisfactory. A student originally admitted on special status will be transferred to full status upon completion of the equivalent of a full quarter of satisfactory work (three units of A or B).

¹ Average halfway between B and C. Transcripts from institutions using a different grading scale will be evaluated by the Examiner and Recorder in terms of the University of Illinois system. Averages are computed on the following basis: A = 5; B = 4; C = 3; D = 2; E (failure) = 1.

A student becomes a candidate for an advanced degree only after he has met the general and departmental requirements, has passed the necessary examinations, and is recommended for candidacy by his major department.

Inquiries should be directed to the Graduate College, 808 South Wood Street, Chicago 12, Illinois. Only graduate work in the medical sciences is offered in Chicago. Prospective students interested in other fields should address their inquiry to the Graduate College, University of Illinois, 109 Administration Building (East), Urbana, Illinois.

Before admission is granted to applicants without course experience in medical or dental professional schools, they must take the Graduate Record Examination including the aptitude test and the advanced test in either biology or chemistry. These tests are administered at numerous centers throughout the country several times each year. Those who wish to take this examination should write to the Educational Testing Service, P.O. Box 592, Princeton, New Jersey, to secure application forms and information concerning the time and place of the next examination.

REGISTRATION AND PROGRAM OF STUDIES

Registration. Graduate students must register at the beginning of each quarter. The registration of a new student may be accepted at any time provided he is prepared to take courses already under way for credit reduced in proportion to the length of time which has elapsed since the beginning of the course. However, credit toward the fulfillment of the residence requirement dates from the time of registration and not from the beginning of the quarter or year in which the student enters. Admission to graduate courses is granted only to persons who have the requisite undergraduate work. The candidate registers for a certain number of graduate units. Each unit represents thirteen hours of laboratory work, or the equivalent, a week. One-half unit may be taken as the minimum each quarter, while three units constitute a full program.

Initial registration is permitted only after a student's application has been approved by the Graduate College and he has been accepted by a department which offers a curriculum leading to a Graduate College degree. Information concerning acceptance may be obtained at the Graduate College office after the application has been processed.

After acceptance a student may obtain registration forms in the Graduate College office and be assigned his major adviser with whom he will discuss his program of study and research. After obtaining the signature of the major adviser, the student will obtain the signature of the instructor for each course. The registration forms are then submitted to the Associate Dean of the Graduate College for approval.

Registration, including the payment of fees, must be completed before the close of the regular, scheduled registration day.

Medical Students and Graduate Study. At the beginning of the second quarter of his second year in medicine, a student who has been in residence for one year and has maintained a B or 4.0 average in the College of Medicine for four quarters of medical work, may be permitted to register for two-thirds unit of graduate work each quarter. Only students of excellent record will be allowed this privilege. Registration may continue in following quarters as long as a 4.0 average is maintained in the medical curriculum.

Medical students who take advantage of this opportunity become familiar with the methods of research and advanced study and are granted credit by several specialty boards for the basic science time credit requirement. Courses credited toward a professional degree can not be used for duplicate credit toward a graduate degree.

Medical students who wish to register for a part-time program of medical work and graduate work to be taken concurrently must submit a program of study, noting the work to be taken in each quarter for the period when both will be pursued. In the case of assistants, the percentage time of employment should be noted in those quarters when service is to be rendered to the department.

Changes in Registration. A graduate student is expected to plan his work so carefully that changes in his program during the quarter will not be necessary. When a change seems advisable, however, it may be permitted if approved by the major adviser, the instructors involved, and by the Associate Dean of the Graduate College. It will be permitted without fee if completed within the date specified in the Calendar. After the indicated date a fee of \$1 is charged for each change. A student is not allowed to withdraw from a course without penalty after the term is half finished if his progress grade in that course is C or below. Exceptions may be made by the Associate Dean in cases of illness or adversity.

A student who wishes to transfer from one department to another must secure and present to the Associate Dean the written approval of his present major department.

Courses Taken at Other Institutions. Students desiring to register for a course at another institution may do so only with the approval of the major adviser. If credit is to be used to meet requirements for a graduate degree, written approval of the adviser and the head of the department of the discipline involved must be presented to the Associate Dean of the Graduate College prior to registration for the course. When the course is completed, the appropriate amount of credit will be accepted and recorded upon receipt of a transcript.

Students on the Staff. Assistants, research assistants, residents, internes, and others on the University staff who undertake to do graduate work are

permitted to take an amount of work determined by the terms of their employment. The maximum number of units that may be taken in a quarter are as follows:

- Full-time employment.....1 unit
- Three-quarter time employment.....1½ units
- One-half time employment.....2 units
- One-quarter time employment.....2½ units

Research assistants paid from outside grants whose registration is limited to research and seminar courses may register for a maximum of work as indicated in the following schedule:

- 76 to 100 per cent time employment.....2 units
- 51 to 75 per cent time employment.....2¼ units
- 10 to 50 per cent time employment.....2½ units

Assistants and others on the University staff whose terms of employment do not apply during the summer quarter may register for a full-time graduate program of three units for that quarter.

Students classified as fellows must register for a full-time program of three units on the basis that all of the student's time is available for research and no routine duties can be required of him.

Graduate Study by Members of the Staff. Work toward an advanced degree is ordinarily permitted to members of the academic staff of the University only while they hold a rank below that of assistant professor. Exceptions in the case of assistant professors may be made as follows: They must become candidates for a degree from this University in a discipline not closely related to the one in which they hold staff appointment. Assistant professors engaged in graduate work toward a degree in this University will not be advanced to the rank of associate professor while so engaged. Research associates are not permitted to carry on graduate work.

Graduate Study in the Summer. A full term of work is available during the summer quarter. Students in the professional colleges during the fall, winter, and spring quarters may register for full-time graduate work during the summer, provided they qualify for admission.

Time Limit for Completion of Degree. Work toward the degree of Master of Science must be completed within five years and for the degree of Doctor of Philosophy within six years from the date of first registration in the Graduate College. Exceptions will be made for those whose work is interrupted by military service.

Change of Program and Withdrawal. Simply ceasing to attend class does not constitute official withdrawal. If a student wishes to drop a course or to add other work, he must first secure an official change slip from the

office of the Graduate College. All changes in program must be approved by the Associate Dean. A student is not permitted to drop a course after the term is half finished if his grade in that course is C or below, unless he is willing to accept a grade of E therein. Exceptions may be made when justified.

A student who wishes to withdraw from the University must obtain a clearance form at the office of the Graduate College.

Grades. Grades are recorded as follows: A, B, C, D, and E. E indicates a failure, C or D indicates unsatisfactory, though passing, work. A student who receives two units of a grade below B must complete two additional units of A or B grade to qualify for a degree. Three units of a grade below B disqualify a student for further work at the graduate level.

A student is automatically placed on probationary status when he has acquired two units below a B grade. Such status will appear on his transcript of record.

A failure or absence from an examination in any course in the major field precludes the conferring of the degree in the year in which the failure occurred.

Attendance at Commencement. Candidates for graduate degrees are required to attend Commencement exercises, unless excused by the Associate Dean of the Graduate College.

THE DEGREE OF MASTER OF SCIENCE

Candidates for the degree of Master of Science are required to do at least three quarters of work in residence. A student is in residence only when registered in the Graduate College and spending full time on the Chicago Professional Colleges campus. Three units constitute a normal quarter program. A thesis and nine units must be completed for the degree. Only superior students are permitted to secure a degree with this minimum program. In all cases the student must satisfy the departmental requirements of his major department and major adviser and must earn at least four units in research courses.

Residence Requirements. Unless prior consent has been obtained from the Committee for Graduate Work, all work must be conducted at the University. Petitions for extramural graduate work are made to the Associate Dean and considered by the Committee for Graduate Work. Such requests must be justified on the basis of facilities which are not available at the professional colleges. The adviser, in such instances, must assume responsibility for the work and make recommendations upon its completion regarding credit and grades to the Associate Dean of the Graduate College.

Transfer of Credit. A graduate student who has completed graduate courses elsewhere may petition for transfer of credit. Such a transfer must

not exceed three units of work and must have the recommendation of the head of the department in which the student is pursuing his program and the approval of the Committee for Graduate Work. In such instances the head of the department must be satisfied that the work is equivalent to the level of graduate courses offered by the University of Illinois. The petition will not be considered by the Associate Dean until the general residence requirement of three quarters has been fulfilled.

Majors and Minors. A candidate for a master's degree may do all his work in one subject, or he may select a major and one minor. Courses offered outside the major department may be included in the student's program if considered appropriate by the adviser. A major or a minor denotes the field of knowledge of a department or such part thereof as constitutes a separate and independent division of that field. For a master's degree, a major represents work totaling a minimum of four units. At least two units are required for a minor.

Foreign Language. A foreign language is not required for the Master of Science degree, but students contemplating work for the doctor's degree may make arrangements to satisfy requirements in one foreign language while they are candidates for the Master of Science degree. Satisfactory demonstration of knowledge of one foreign language must be completed before unit credit will be allowed toward a Doctor of Philosophy degree.

Thesis. A candidate for a master's degree must submit a thesis on a subject approved by the professor in charge of his major work. Such approval must be secured, and the subject of the thesis filed at the office of the Graduate College not later than the beginning of the last quarter of residence.

Thesis Work in Absentia. A student may be permitted to complete the last two units of his work, if devoted to his thesis, under leave of absence. To receive such permission, the student must have accumulated at least seven units in residence, must petition for the privilege, and must submit to the Committee for Graduate Work an outline of the proposed investigation approved by the head of his major department and satisfactory evidence that adequate facilities are available at the place where he intends to do the proposed work. If the petition is approved, the student must register, pay tuition fees, and discuss his progress with his major adviser at frequent intervals.

Thesis Preparation. Specific written instructions for the preparation and form of the thesis are available at the Graduate College office. Special thesis paper is required, and title pages and envelopes must be printed. Two copies of the approved thesis are required, one for the University Library at Urbana and the other for the Library of Medical Sciences at Chicago. The thesis may be submitted at any time during the year; however, candi-

dates who expect to receive a degree in June must meet the deadline indicated in the Calendar.

Oral Examination. Upon deposit of the thesis, a committee is appointed by the Associate Dean to examine the thesis and to determine the candidate's knowledge in the major and minor fields of study. Degrees are conferred at the June Commencement. Candidates must be recommended to the Associate Dean for the degrees indicated at least two weeks before the date set for the Commencement exercises (see Calendar).

Publication of the master's thesis is encouraged and does not require prior approval of the Graduate College.

Applications for Degrees. Each candidate for the degree of Master of Science must file an application for the degree on a blank provided for that purpose. For the dates of application and deposit of theses, consult the Calendar.

THE DEGREE OF DOCTOR OF PHILOSOPHY

Admission by Qualifying Examination. Students desiring admission to graduate study beyond the Master of Science degree must file an application with the Graduate College. No student will be admitted without the recommendation of a committee of three appointed by the Associate Dean to conduct a qualifying oral examination and prescribe a program of study and course work.

Period of Study. The normal minimum period of study required for the degree of Doctor of Philosophy is two years beyond the master's degree, during which the student is required to devote all of his working time to his studies. Both years must be spent in residence at some accredited educational institution. If the student has obtained his Master of Science degree at the University of Illinois, one of the two years may be spent in absentia, if approved by the Committee for Graduate Work. The degree is conferred, however, not for residence during a certain period, but for scholarly attainments and power of investigation, as proved by a thesis and examination.

Major and Minor Subjects. A student who wishes to become a candidate for the degree of Doctor of Philosophy must earn a total of eighteen units beyond the master's degree, nine units of which must be in research courses. He must pursue a major subject in the discipline in which his research lies. He is also required to choose one minor subject, or he may choose two. If only one minor is chosen, it must be taken in a discipline other than that of the major, and credit for it may be earned by work representing not less than four units. If two minors are chosen, one must be a subject closely related to the major. With the approval of the adviser, it may be a division of the major field of study. The other minor

(not less than two units) must, in that case, be taken in a discipline other than that of the major. Units earned in the minor field while pursuing work toward the Master of Science degree may be counted in the total required for a minor. A student whose major is in a clinical department must select a minor in a basic science; the department head of the science chosen or his representative shall act as co-adviser to the student. Upon arrangement by the major adviser with the Associate Dean, a student may pursue, without unit credit toward the degree, a basic science course not specifically required in the Doctor of Philosophy program. Grades obtained in such courses will not be prejudicial to the student's standing in the Graduate College. It is obvious, however, that unsatisfactory grades may be detrimental to his general progress and standing in the area of his major and minor departments as determined by those departments. Not more than two units of a minor shall consist of work in research courses (493).

In a Doctor of Philosophy program the minor must be selected in a discipline which has an approved curriculum leading to the Master of Science degree.

The preliminary examination in major and minor subjects may not be taken until the minor work and language requirements have been completed.

Preliminary Examinations. A candidate for the Doctor of Philosophy degree must pass a preliminary examination intended to test his knowledge of his major and minor fields of study and to determine whether he is prepared for the final year of work. The examination extends to the candidate's whole field of study. It will not be confined to specific courses taken in this or other universities, but will be conducted to determine whether the candidate has mastered a definite field of knowledge and is able to evaluate its potentialities and opportunities for further advances. The student must also satisfy the committee that he is able to integrate his field of specialization with the larger domains of knowledge and understanding. The examination is partly oral, and may be wholly so.

The student will not be admitted to his preliminary examination until (1) he has passed the two required foreign language examinations; (2) he has completed satisfactorily nine units of work beyond his master's degree, including four units in the minor; and (3) his adviser recommends to the Associate Dean that he is adequately prepared for the examination. He must complete two quarters of residence between his preliminary examination and the completion of his work for the doctorate.

Final Examination. At least two weeks before the time when the degree is conferred (consult the calendar for latest dates for final examination), the candidate must submit to a final examination given by a

committee appointed by the Associate Dean. This examination is primarily on the research work of the student as embodied in his thesis and is conducted chiefly to determine if the candidate has demonstrated the capacity to do original and independent scholarly investigations in the field of his choice, but is not confined to that alone. It is intended to verify also that the candidate has a satisfactory grasp of his major subject as well as an acquaintance with the field of knowledge pertaining less directly to it.

If, after having passed his preliminary examination, he fails in the third year of his study to meet the expectations of the professors in charge of his work, or in any way fails to maintain the standard of scholarship and power of research expected of him, he may be refused admission to the final examination.

Other Examinations. Before the candidate is admitted to the final examination and defense of his thesis, he may be required to take any other examination, oral or written, which is thought proper by the various departments in which he has studied.

The above examinations are in addition to those in the courses for which the student is registered, and must be taken at the times set by the major adviser.

Thesis. The ability for independent research must be shown by the production of an original thesis on some topic connected with the major field of study. The candidate is expected to defend his thesis or dissertation before the members of the faculty, or as many of them as may wish to question him about it, in connection with his final examination.

The subject of the thesis should be chosen and the title submitted to the Graduate College office not later than the first registration following successful completion of the preliminary examination.

Not later than two weeks prior to the final examination, and not less than four weeks before the time when the degree is to be conferred (see Calendar), two typewritten copies of the complete thesis and two copies of the abstract on thesis paper and in final form with title pages, envelopes, and certificates of approval, must be deposited in the office of the Graduate College for presentation to the examining committee. The style and form of the thesis and abstract must comply with the written instructions obtainable at the Graduate College office.

Abstract. The abstract is to indicate the method followed, the evidence used, and the conclusions reached in the investigation, and must follow the form generally used for publication of abstracts. It should not exceed six hundred words.

Certificates. Each of the copies of the thesis and of the abstract must be accompanied by a certificate of approval. The certificate forms are available in the office of the Associate Dean and must be signed by the

person under whose immediate supervision the thesis was prepared and also by the head of the major department. In considering the deadline for submitting the thesis and abstract to the Graduate College in its final form, the adviser and student will allow the head of the department sufficient time to read both the abstract and the thesis before affixing his signature of approval to the certificates. These certificates must also be signed by the members of the examining committee immediately following the oral examination.

Microfilm Reproduction. The candidate shall pay \$30.00 to have his thesis microfilmed by an approved microfilming service. To accomplish this the candidate must deposit two copies of his thesis and two copies of an abstract, not exceeding six hundred words, with the Graduate College. He will pay the Cashier \$30.00 when he obtains his clearance paper prior to the oral examination.

This fee will provide for microfilming of the complete dissertation, with one copy deposited in the University of Illinois Library at Urbana, and publication of an abstract of six hundred words in Dissertation Abstracts.

Application for Degree. Each candidate for the Doctor of Philosophy degree shall file an application for the degree on a blank provided for that purpose. Application is made at the time the thesis is submitted in final form to the Associate Dean.

FELLOWSHIPS

A student on fellowship appointment must register in the Graduate College and must pursue a program of academic study and research leading to a graduate degree. Stipends paid to the individual are not for definite services performed for the University, but are to provide living expenses while the approved course of study or research is being pursued. Fellows must devote full time to such activities, and no teaching, proctoring, grading of papers, or other routine duties shall be required of them. Fellows are chosen on a competitive basis by committee action.

Ten University Fellowships are awarded annually through the Graduate College for the Chicago Professional Colleges. Stipends of \$1,500 for pharmacy graduates and \$1,800 to \$2,400 for medical and dental graduates are available. Fellows are eligible for reappointment in competition with new applicants. Fellowships provide an opportunity for research training in the basic sciences, or in the application of these sciences to clinical investigation. They are intended primarily for graduates who are in the early stages of their preparation for a teaching and research career. Fellowships are not intended to provide stipends for those pursuing professional specialty board requirements.

Candidates must have completed a minimum of training in any one of the following ways or the equivalent thereof: (1) bachelor's degree and

Doctor of Medicine degree, (2) bachelor's degree and Doctor of Dental Surgery degree, (3) bachelor's degree in pharmacy and Master of Science degree. Eligibility for Graduate College admission is a prerequisite for fellowship appointment.

Two University Fellowships are awarded in the basic medical sciences. The purpose of these fellowships is to encourage scholars to prepare for teaching and research careers in the medical, dental, and pharmacy colleges. To be eligible, the candidate must have (1) a Master of Science degree in a basic medical science, (2) promise as an investigator and teacher, (3) a 3.5 minimum average for all undergraduate work, and (4) a scientific course background essentially the same as that required of premedical students. The program followed by fellows includes course work in the basic medical sciences, the usual University requirements for the Doctor of Philosophy degree, and study and research over a three-calendar-year period. The stipend is \$1,500 for twelve months and is renewable for two additional years. Evidence of good scholarship and promise of research ability are primary considerations. The fellowships provide an opportunity for research experience in the basic sciences and the application of these sciences to clinical investigation. All University Fellowship candidates are exempt from fees except the late registration fee. Registration for full-time graduate work is required.

Application forms may be obtained from the office of the Associate Dean and must be submitted by March 15 for appointments which become effective on the following July 1 or September 1. Applications should be mailed to the Associate Dean of the Graduate College, Room 383, 808 South Wood Street, Chicago 12, Illinois.

Industrial fellowships of \$1,500 each, granted by Smith, Kline, and French Laboratories, are available for students with majors in pharmacology. The fellowships are awarded on a competitive basis and require no duties of the recipients except that they make normal progress as full-time graduate students.

In addition to the above, the American Foundation for Pharmaceutical Education, 330 West 42nd Street, New York 18, New York, offers support in the nature of a stipend and payment of tuition to selected students who may choose to conduct their graduate work at the University of Illinois. Applications are made directly to the Foundation.

Attention of all graduate students is directed to fellowship support offered by federal agencies such as the National Research Council, Washington 24, D.C., and the National Institute of Health, Bethesda, Maryland. A student should apply directly to those agencies and may obtain approval to conduct his work at the University of Illinois if accepted as a graduate student.

ASSISTANTSHIPS

A number of departments offer half-time assistantships carrying an annual minimum stipend of \$1,350. Assistants are required to perform services for the University in the nature of grading papers, proctoring, and assisting in laboratory teaching or research. Research assistants also are assigned to specific projects supported by outside funds.

Applicants should apply directly to the department after ascertaining their eligibility for graduate work. Assistants must carry a reduced study schedule as indicated on page 25 of this catalog, but the greater length of time required to complete the degree is compensated for by the additional gain in teaching and research experience.

FEES

Students in the Graduate College are subject to the regulations governing fees for each of the following:

Tuition Fee. The tuition fee in the Graduate College is \$16.00 per unit for residents of Illinois, or \$44.00 per unit for nonresidents.

Laboratory, Library, and Supply Fee. A fee of \$7.50 per quarter is charged all students.

Illini Union Service Charge. All students registering for resident work, except those who are members of the University staff and others who are registered for not more than one unit of graduate work, are assessed \$3.50 each quarter for an Illini Union service charge.

Late Registration Fee. Former students who register after their regular scheduled registration day in any quarter pay a late registration fee of \$5.00.

Study-List Change Fee. For every change issued later than noon on the day indicated in the Calendar the fee is \$1.00.

Transcript Fee. Each student who has paid all his University fees is entitled to receive, without charge, one transcript of his record. For each additional transcript, the fee is \$0.50.

Service Charge for Deferred Fees. A service charge of ten per cent of the amount of fees deferred, but not to exceed \$2.00 a quarter, is assessed for the privilege of deferring fees. If deferred fees are paid in full within ten days after registration, the service charge is refunded except that a minimum service charge of \$1.00 is retained by the University in all cases. The service charge for deferring fees and all charges from previous quarters must be paid on the day of registration.

Fees for Fellowship Appointees. Graduate fellows whose stipends are paid from general appropriations of the University are exempt from fees. This does not apply, however, to fellows whose stipends are paid from

grants received by the University from outside sponsors of graduate study and research.

Fees for Medical Students. Students registered concurrently for graduate work and full-time medical work are exempt from graduate fees.

Fees for Persons on the University Staff. Members of the academic, administrative, or permanent nonacademic staff of the University of Illinois may register in University courses without payment of the tuition fee and the laboratory, library, and supply fee, provided that their annual salary for nine months is less than the minimum salary established for full-time assistants (\$2,700). For persons employed on a twelve month basis, the upper limit of this exemption is \$3,300.

FIELDS OF INSTRUCTION

Courses open to graduate students are of two classes. Those numbered from 300 to 399 are open to advanced undergraduate and graduate students. Those numbered 400 and above are open to graduate students only.

Many courses for graduate students require some measure of previous preparation. A student who wishes to enter a particular course must satisfy the department concerned that he has had, either at the University of Illinois or elsewhere, the necessary preparation for admission to the course.

The credit value of graduate courses is given in units. Quarters in which courses are taught are indicated by F, W, Sp, or S representing fall, winter, spring, and summer, respectively.

ANATOMY

The Department of Anatomy offers graduate study leading to the degrees of Master of Science and Doctor of Philosophy.

Candidates for the Master of Science degree with previous undergraduate training only will be required to take the courses in histology, hematology, neuroanatomy, tissue culture, and cancer biology, and to attend the seminar in anatomy. This program will be completed during the first year. If the student gives promise of becoming a candidate for the Doctor of Philosophy degree, gross anatomy is recommended. Candidates with the Doctor of Medicine or Doctor of Dental Surgery degree will not be required to take histology or neuroanatomy.

Candidates for the Doctor of Philosophy degree must take gross anatomy, in addition to the courses in anatomy required for the Master of Science degree, and a minor course of study in one of the other basic medical science departments. It is recommended that the candidate complete courses in all six basic sciences. These need not be the courses offered to medical students and may have been completed prior to entrance into

the Graduate College, or during the course of study leading to the Master of Science degree.

A split minor in biological chemistry must include at least one-half unit of Biological Chemistry 491 and one-half unit of another 400 level course in the department other than Biological Chemistry 493. A full minor in biological chemistry must include at least one unit of Biological Chemistry 491 and one unit of another 400 level course in the department other than Biological Chemistry 493.

A thesis is required for both the degrees of Master of Science and Doctor of Philosophy. It must be in an area that provides research training in morphological methods.

GRADUATE TEACHING FACULTY

Professors: ARTHUR KIRSCHBAUM (Head of Department), PARKE H. SIMER, GERHARDT VON BONIN, ARNOLD A. ZIMMERMANN.

Associate Professors: ROBERT H. KREHBIEL, JAMES C. PLAGGE.

Instructors: ARTHUR LAVELLE, JEWEL I. PLUMMER.

COURSES FOR GRADUATES

- 310. Cancer Biology.** Morphology and etiology of experimental neoplasms, primarily of the mouse. Laboratory includes experimental morphologic methods, such as small animal surgery, tissue transplants, vaginal smears, etc. Autopsies of tumor-bearing animals. Laboratory and lectures. Sp; ½ unit.
- 311. Hematology.** Origin and relationships of blood cells; embryonic, pathologic, and experimental blood formation. Laboratory includes exercises in methods as well as diagnosis of cell types. Laboratory and lectures. W; ½ unit.
- 350. Clinical Anatomy.** Redissection of the body, stressing the topography and relations of the various regions and organs, as displayed by incisions, window dissections, and transections; intimate correlation of subject matter with clinical conditions and procedure. F, W, Sp; ½ unit. Prerequisite: Gross anatomy.
- 382. Tissue Culture.** Methods of culturing cells in vitro; discussions on cellular function as revealed by cultures; applications of the methods. Laboratory and lectures. Sp; ½ unit.
- 401. Gross Anatomy.** Regional and systematic dissection of the human body: upper extremity, thorax, abdomen. Functional and applied considerations. F; 1 unit.
- 402. Gross Anatomy.** Regional and systematic dissection of the human body: pelvis and lower extremity. W; 1 unit.
- 403. Gross Anatomy.** Regional and systematic dissection of the human body: head and neck. Sp; 1 unit.
- 404. Histology.** Morphology and functions of cells and fundamental tissues. Laboratory and conferences. F; 1 unit.

405. **Organology.** Continuation of Anatomy 404. Microscopic structure of the organs. Laboratory and lectures. W; 1 unit.
407. **Neuroanatomy.** Anatomy and functions of the human nervous system; architecture of the nervous system and the functions of the nervous pathways. Laboratory and lectures. Sp; 1 unit.
491. **Seminar in Anatomy.** Presentation and discussion of individual investigations by members of the department and others; reviews of important contributions in morphologic investigation. F, W, Sp; $\frac{1}{4}$ unit per quarter. One seminar presentation a year required for credit.
493. **Research in Anatomy.** Research in any of the basic divisions. F, W, Sp, S; credit to be arranged.

BACTERIOLOGY

The plan for graduate training of bacteriologists at the professional colleges, while it does emphasize the medical, dental, and pharmaceutical aspects, recognizes the fact that fundamental work in the whole field of bacteriology is essential to a concrete approach to the many unsolved problems in the field. Proper background in chemistry, including biological chemistry, biometrics, and physiology, is a definite asset to an understanding of the biology of bacteria and their interrelationships to other living things. While investigative work frequently follows medical lines, students are required to encompass the entire field of bacteriology including the related microorganisms such as the viruses, fungi, and rickettsia, and the immunological, physiological, and biochemical principles which involve each group. A broad knowledge of the field is required. Specialization in virology, mycology, or immunology is incidental as it pertains to the student's research effort and thesis.

The program is designed to achieve the following objectives: (1) training for future careers in medical research and teaching, (2) training of bacteriologists in the fundamental and applied techniques in diagnostic work, and (3) training of investigators for research positions in industry, especially those involved in the development of new biologicals and anti-bacterial agents.

Applicants are considered in the order of the qualifications presented. Students having the Doctor of Medicine or Doctor of Dental Surgery degree, or currently pursuing these degrees, are given preference. Minimum requirements are those that apply to all applicants for graduate work in the professional colleges, namely completion of the premedical curriculum, a bachelor's degree, and a minimum grade-point average of 3.5. Selections are made from applicants who have the best backgrounds as determined by a departmental committee. Selection of applicants for work for the Doctor of Philosophy degree is made from those who have obtained master's degrees in the department except in very exceptional cases.

To secure a firm foundation in bacteriology, the student is required to take certain courses and urged to attend various seminars in other departments and to do systematic reading and study.

For the Master of Science degree, Bacteriology 320, 325, and 491 are required. Four units must be earned in course 493 and three units in other bacteriology courses in the 400 group. A student who anticipates applying for work toward the Doctor of Philosophy degree must first complete Biological Chemistry 301, 302, and Public Health 401.

For the Doctor of Philosophy degree, a minimum of ten units of didactic course work including those applied to the Master of Science degree are required. Suggested courses include Physiology 324, 325, 326 and Chemistry 409, 410. At least nine units must be in research courses. Four units in a suitable minor as approved at the time of the qualifying examination are required. The usual Graduate College requirements which apply to all students at this level of training shall apply to the candidate for a Doctor of Philosophy degree.

GRADUATE TEACHING FACULTY

Professors: MILAN V. NOVAK (Head of Department), J. EMERSON KEMPF.

Assistant Professors: GEORGE F. FORSTER, ESTHER MEYER, WELTON I. TAYLOR, EDWARD E. VICHER.

COURSES FOR GRADUATES

- 320. Bacteriology and Related Microbiology.** A study of the general morphology, metabolism, serology, and pathogenicity of the important microbial agents of communicable diseases; action of germicidal agents, sulfonamides, penicillin, streptomycin, and other antibiotics; factors in parasitic offense and mechanisms of host defense; detailed consideration of pathogenic bacteria. Three lectures and six hours laboratory each week. F; 1 unit.
- 325. Bacteriology and Related Microbiology.** Continuation of Bacteriology 320. Detailed consideration of viruses, pathogenic fungi, spirochaetes, rickettsia, and other microbial agents of disease; serological methods and routine hospital laboratory procedures applicable to diagnosis of communicable diseases. Two lectures and four hours laboratory each week. W; $\frac{3}{8}$ unit. Prerequisite: Bacteriology 320 or general bacteriology.
- 401. Cytology and Metabolism of Microorganisms.** Bacterial structure as it is related to function and biochemical activity of the cell; influence of germicides, antibiotics, and other substances on the morphology and metabolism of bacteria; nature of bacterial respirations. Sp; 1 unit. Prerequisite: General bacteriology; biological chemistry.
- 402. Immunology.** A course designed to teach the general principles of serological reactions, preparation of biologicals, production of the immune condition in animals, demonstration of the cellular mechanisms of immunity, the allergic response, blood groups, forensic serological tests, and practical diagnostic methods based on serological and cutaneous reactions. W; 1 unit. Prerequisite: General and medical bacteriology.

- 403. Virology.** Lectures and laboratory work on the nature of viruses, their physical, chemical, and biological characteristics; methods for propagating them in the laboratory; technique of isolating viruses; purifying, concentrating, and observing them on the electron microscope; identification by laboratory procedures; preparation and testing of vaccines. W; 1 unit. Prerequisite: General and medical bacteriology.
- 404. Medical Mycology.** A general survey of fungi with special reference to the pathogenic groups causing both superficial and deep mycotic infections. Two lectures and six hours laboratory each week. W or Sp; 1 unit.
- 491. Seminar and Literature Review.** Presentation of timely subject material and individual research contributions. Each student is required to present one seminar each quarter. Required of all graduate students. F, W, Sp; ½ unit. Prerequisite: General bacteriology.
- 493. Research in Bacteriology.** Individual research in the field of bacteriology, including allied subjects usually included under this title such as virology, immunology, mycology, and protozoology. F, W, Sp, S; credit to be arranged. Prerequisite: General and pathogenic bacteriology.

BIOLOGICAL CHEMISTRY

The objectives of the Department of Biological Chemistry in offering graduate training are (1) to develop teachers of the subject for colleges of medicine, dentistry, and pharmacy; (2) to develop investigators in this field and the allied biological sciences; (3) to help provide an environment for better teaching of professional students in the medical sciences at the University of Illinois, and (4) to aid the academic staff in the department in obtaining new knowledge through research endeavor.

In general, the admission requirements are those which apply to all applicants for graduate work at the professional colleges. Since the approach to biological chemistry may be either primarily chemical or biological, the requirements for graduate work in the department are flexible enough to permit admission of individuals of quite different backgrounds. The undergraduate training should include sixteen semester hours of chemistry including organic, quantitative analysis, and physical chemistry; eight semester hours of physics, including laboratory work in electricity, heat, mechanics, and sound; at least one thorough course in biology; and at least six semester hours of German or French. Students having a bachelor's degree, including the above minimum course requirements, as well as medical and dental graduates or students pursuing these professional degrees, are eligible to apply for graduate work in the department.

Candidates for the Master of Science degree in biological chemistry are required to take Biological Chemistry 301, 302, 491, and 493 (four units). Of the nine units required for the Master of Science degree at least one unit must be taken in basic courses offered in anatomy, bacteriology,

chemistry, pathology, pharmacology, or physiology and one unit in advanced courses in biological chemistry.

Candidates for training beyond the degree of Master of Science shall have earned this degree or met the requirements for this degree in the Graduate College or completed work of equivalent value elsewhere. The requirements for the Doctor of Philosophy degree include Biological Chemistry 301, 302, 410, 420, 421, 491 (one unit), and 493 (nine units); Physiology 324 and 325; Chemistry (pharmaceutical) 301, 305, and 306. The remaining courses must be selected to complete an appropriate minor of four units and a total requirement of eighteen units beyond the master's degree.

A split minor in biological chemistry must include at least one-half unit of Biological Chemistry 491 and one-half unit of another 400 level course in the department (other than course 493). A full minor must include at least one unit of Biological Chemistry 491 and one unit of another 400 level course in the department (other than course 493).

The thesis and language requirements must conform to the general requirements of the Graduate College, and the thesis must be of sufficient merit to warrant publication in full or in part in a recognized chemical journal.

GRADUATE TEACHING FACULTY

Professors: RICHARD J. WINZLER (Head of Department), OLAF BERGEIM, STEPHEN B. BINKLEY, DOUGLAS A. MACFADYEN.

Associate Professors: MAX K. HORWITT, CLARENCE A. JOHNSON.

Assistant Professors: PAUL KOHN, MAX E. RAFELSON.

COURSES FOR GRADUATES

- 301. Biological Chemistry.** Chemistry of the constituents of tissues and body fluids, and current methods for their qualitative and quantitative determination; digestion, absorption, and intermediary metabolism of lipids, proteins, and carbohydrates in health and disease, and the role of hormones, vitamins, and enzymes in the regulation of these processes; the application of this knowledge to the problems of disease. Lectures, conferences, and laboratory. F; 1 unit.
- 302. Biological Chemistry.** Continuation of Biological Chemistry 301. Lectures, conferences, and laboratory. W; 1 unit.
- 331. Biological Chemistry.** Comparable to Biological Chemistry 301. W; 1 unit.
- 332. Biological Chemistry.** Continuation of Biological Chemistry 331. Comparable to Biological Chemistry 302. Sp; 1 unit.
- 410. Biochemical Preparations.** A laboratory course involving the preparation of biologically important substances and the evaluation of their purity. F, W, Sp, S; $\frac{1}{2}$ unit. Prerequisite: Biological Chemistry 301 and 302, or equivalent.

- 420. Intermediary Metabolism of Carbohydrates.** An advanced course considering in detail the chemistry and intermediary metabolism of carbohydrates. The production and utilization of energy, the enzyme systems involved, and the intermediates encountered in biological systems are considered. Lectures. Sp; ½ unit. Prerequisite: Biological Chemistry 301 and 302, or equivalent.
- 421. Intermediary Metabolism of Lipids, Proteins, and Nucleic Acids.** An advanced course considering in detail the intermediary metabolism of the biologically important lipids, amino acids, proteins, and nucleic acids. Lectures. F; ½ unit. Prerequisite: Biological Chemistry 301, 302, and 420, or equivalent.
- 430. Nutrition.** Historical development of modern nutritional concepts on the role of the vitamins, amino acids, fat, and inorganic salts in metabolic processes. Special emphasis on current research. Lectures. W (alternate years); ½ unit. Prerequisite: Biological Chemistry 301 and 302, or equivalent.
- 491. Seminar in Biological Chemistry.** Student and faculty presentation of assigned subjects of current importance in biological chemistry and related fields. Assigned reading. F, W, Sp; ½ unit.
- 493. Research in Biological Chemistry.** Research on problems of biological importance with members of the graduate staff. F, W, Sp, S; credit to be arranged.

CHEMISTRY (PHARMACEUTICAL)

Graduate education in pharmaceutical chemistry is a necessary part of a program to advance rational medication in the health sciences. Opportunities for the employment of the specialized knowledge acquired by graduate training in this field are available in the pharmaceutical industry in the synthetic development of new medicinal agents, the creation of new and stable dosage forms, the qualitative and quantitative evaluation of natural and synthetic drugs, the protection of quality in the manufactured product, the improvement of production processes, and the interpretation of the physical sciences to the health professions and the public. Equally important opportunities are available in the field of pharmaceutical education where a presently acute and always steady demand for teachers with this type of specialized education exists.

Admission to graduate study in pharmaceutical chemistry is subject to the general regulations of the Graduate College. The applicant should have received the degree of Bachelor of Science in Pharmacy from a college or university approved by the Graduate College of the University of Illinois. His undergraduate program should have comprised, among other things: (1) thirty-six semester hours of undergraduate courses in chemistry, including at least ten hours of general inorganic chemistry and qualitative analysis, four hours of quantitative analysis, eight hours of organic chemistry,

and three hours of physical chemistry; (2) eight semester hours of general physics; (3) six semester hours of college mathematics.

All students enrolled for their first year of graduate study in the Department of Chemistry are examined on their knowledge of the fundamental principles of inorganic, analytical, physical, and organic chemistry, and their ability to correlate these principles. Examinations in these subjects are offered during the latter part of the spring quarter each year. The results of these departmental examinations are the basis for admission to the regular oral examination for the master's degree.

Of the minimum nine units required for the Master of Science degree in pharmaceutical chemistry at least four units shall have been completed in course work acceptable for graduate credit and at least four units shall have been completed in work leading to the production of an acceptable thesis (Chemistry 493). If, in the judgment of the major adviser, the undergraduate background is incomplete, the applicant may be required to complete more than the minimal number of units in course work before a thesis subject is completed.

Applicants for admission to a program of study leading to the degree of Doctor of Philosophy in pharmaceutical chemistry are subject to the general rules of the Graduate College.

The minor field of study may be selected from bacteriology, pharmacognosy, pharmacology, and pharmacy.

An acceptable thesis shall be presented as the result of original investigation in the major field of study accomplished during registration in Chemistry 493.

All graduate study programs in pharmaceutical chemistry are under the general supervision of the head of the Department of Chemistry. The applicant may select any member of the graduate faculty in the department as his major adviser and the major adviser shall have immediate supervision of the applicant's program of study, subject to the approval of the head of the department.

A departmental examination which is partly written and partly oral is required of graduate students majoring in pharmaceutical chemistry at the end of the second year of graduate study. This examination is designed to demonstrate the student's knowledge of modern theory and practice in the field of chemistry and his ability to present that knowledge in an oral exposition of his projected line of research. On the basis of the quality of the performance, the major adviser may recommend the student for examination by the preliminary committee in the immediate future or may recommend further preparatory study.

GRADUATE TEACHING FACULTY

Professors: GEORGE L. WEBSTER (Head of Department), ERNST R. KIRCH.

Associate Professors: JAMES E. GEARIEN, ALFRED J. PERKINS.

Assistant Professors: CHARLES W. CLARKE, RALPH DANIELS, NORMAN R. JOSEPH,
EDWARD E. SMISSMAN.

COURSES FOR GRADUATES

- 301. Qualitative Organic Analysis.** A study of the physical and chemical properties of organic compounds, their classification reactions and methods of synthesis of typical derivatives which will lead to the identification of individual compounds. Conferences and laboratory. Offered to classes of four or more students after consultation with the head of the department. F, W, Sp, S; $\frac{1}{2}$ unit. Prerequisite: One year of organic chemistry.
- 302. Ultimate Analysis of Organic Compounds.** Study and practice in the methods of analysis for common elements in organic compounds. Conferences and laboratory. One conference and minimum of eight hours laboratory each week. F, W, Sp, S; $\frac{1}{2}$ unit. Prerequisite: One year of organic chemistry.
- 303. Advanced Drug Assay.** Conferences, library and laboratory work related to the methods of detecting impurities which develop and determining the quality of drugs during storage, the improvement of existing methods of assay of drugs or the development of new assays or new types of assays. F, W, Sp, S; $\frac{1}{2}$ to 2 units. Prerequisite: Quantitative analysis, drug assay, chemistry of synthetic drugs, chemistry of natural products.
- 304. Phytochemistry.** Lectures, library and laboratory work in the properties and suitable methods of isolation and purification of typical examples of plant constituents. Lectures and library work may be elected without laboratory, but students electing laboratory work must elect the lectures either simultaneously or as a prerequisite. Offered to classes of four or more students. F, W, Sp, S; $\frac{1}{2}$ to 2 units. Prerequisite: Drug assay and chemistry of natural products.
- 305. Advanced Organic Chemistry — Reactions.** A study of the mechanisms and applications of organic chemical reactions frequently used in synthesis. Lectures and laboratory work. Three lectures each week. Offered to classes of four or more students. F, W, or Sp; $\frac{1}{2}$ unit. Prerequisite: One year of organic chemistry.
- 306. Advanced Organic Chemistry — Theory.** A study of the theories of organic chemical reactions and structure. Lectures and library work. Three lectures each week. Offered to classes of four or more students. F, W, or Sp; $\frac{1}{2}$ unit. Prerequisite: One year of organic chemistry.
- 308. The Chemistry of Heterocyclic Compounds.** Lectures and assigned reading and problems on the occurrence, nomenclature, reactions, and methods of synthesis of the heterocyclic compounds containing oxygen, sulfur, and nitrogen. F, W, or Sp; $\frac{1}{2}$ unit. Prerequisite: One year of organic chemistry.
- 311. Advanced Inorganic Chemistry.** Discussion of electronic structure of atoms and relation to properties; valence theory; configuration and properties of complex ions; detailed study of chemistry of selected groups of elements. Laboratory work includes preparation of inorganic compounds selected to

emphasize techniques of inorganic chemistry and develop skill in manipulation. Sp (alternate years); 1 unit.

- 312. Introduction to Chemical Thermodynamics.** An introduction to the fundamental theory of thermodynamics with emphasis on its application to chemical problems. Sp (alternate years); $\frac{1}{2}$ unit. Prerequisite: Physical chemistry.
- 342. The Chemistry of Synthetic Drugs.** A study of modern synthetic drugs with regard to their nomenclature, methods of synthesis, relation to other drugs having similar therapeutic properties, physical and chemical properties. Four lectures each week. F; $\frac{1}{2}$ unit. Prerequisite: One year of organic chemistry.
- 343. Chemical Toxicology.** A course concerned with the common sources; chemistry of the physiological action, methods of isolation, and identification of toxic agents commonly encountered as industrial hazards and as the cause of accidental or purposeful poisoning. Two lectures and three three-hour laboratory periods each week. Sp; $\frac{1}{2}$ unit. Prerequisite: Organic chemistry and concurrent registration in pharmacology.
- 346. Synthesis of Drugs.** A continuation of the study of organic chemistry with practice in and emphasis on the application of general and special reactions to the synthesis of drugs. Lectures, library, and laboratory. Two lectures and three three-hour laboratory periods each week. F; $\frac{1}{2}$ unit. Prerequisite: One year of organic chemistry.
- 349. Pharmaceutical Assaying.** Chemical and physical methods of analysis of raw materials and dosage forms of medication involving the principles of sampling and quantitative separation of active compounds from inactive diluent or vehicle or from other active components. Two lectures or conferences and three three-hour laboratory periods each week. W, Sp; $\frac{1}{2}$ unit. Prerequisite: Drug assay.
- 350. Instrumental Analysis.** The principles, methods, and techniques of analytical chemistry using modern electrical and electronic instruments. Three lectures and two three-hour laboratory periods each week. W; 1 unit. Prerequisite: Physical chemistry, quantitative analysis, organic chemistry, and physics.
- 409. Vitamin Assay.** Methods for determining vitamins in pharmaceutical and food products by the use of the spectrophotometer and fluorophotometer; microbiological methods for determining vitamins and other nutritives. Three conferences and ten to twelve laboratory hours each week. F, Sp, or S; 1 unit.
- 410. Vitamin Assay.** Continuation of Chemistry 409. S, F, or W; 1 unit.
- 436. Physical Biochemistry.** General theories of homogeneous and heterogeneous equilibrium in physico-chemical systems; chemical kinetics with special reference to enzymes; theories of colloidal behavior; applications of general principles to problems involving cells and tissues. Emphasis is placed on methods of physical chemistry as applied in medical sciences. Lectures and seminars. Sp; $\frac{1}{2}$ unit.

491. **Seminar in Pharmaceutical Chemistry.** Weekly reviews, reports, and discussions of topics drawn from the literature of chemistry or from research. F, W, Sp; $\frac{1}{2}$ unit.
493. **Research in Pharmaceutical Chemistry.** Individual research under the direction of a member of the staff. F, W, Sp, S; credit to be arranged.

HISTOLOGY

The Department of Histology offers work toward the degree of Master of Science in histology. The program is devised to provide training for teachers and investigators in the field of histology as it applies more specifically to the basic sciences related to dentistry. A student, however, is required to have a knowledge of the entire field of histology as it applies to the human body.

In addition to the general requirements of the Graduate College, the applicant must have received his Doctor of Dental Surgery degree. In certain cases an undergraduate dental student with a bachelor's degree may be accepted providing he has maintained at least a B average and has completed at least four quarters of the dental curriculum. Nonprofessional students are not accepted.

Course requirements include Histology 401 and at least four units in Histology 493 and 494. Attendance at the Oral Research Seminar is required but does not carry graduate credit.

A thesis on an original investigative problem is required.

Students completing the requirements for the master's degree in histology may apply for admission for work toward the Doctor of Philosophy degree in the Department of Anatomy and must comply with requirements of that department for the doctorate.

GRADUATE TEACHING FACULTY

Professor: ISAAC SCHOUR (Head of Department).

COURSES FOR GRADUATES

401. **Advanced Oral Histology.** Lectures, discussions, and laboratory work pertaining to special subjects and problems in oral histology. W, Sp; $\frac{1}{2}$ to 1 unit. Prerequisite: Histology 305, 328, and 329, and/or equivalent.
493. **Research in Microscopic Anatomy of Teeth and Related Structures.** W, Sp; credit to be arranged. Prerequisite: Histology 305, 328, 329, and/or equivalent.
494. **Research in Experimental Histo-Physiology of Teeth and Investing Tissues.** F, W; credit to be arranged. Prerequisite: Histology 401.

MEDICINE

The Department of Medicine offers work leading to the Master of Science degree. The program is designed to afford training for a keener approach to the theory of medicine by emphasis on basic sciences, to pro-

vide experience in research method in the clinical field, and to develop clinical teachers who will have greater promise of rendering instruction to medical undergraduates.

A Doctor of Medicine degree is required for admission in addition to the usual requirements of the Graduate College, with the exception that currently registered medical students may be accepted if they have the bachelor's degree and have completed at least four quarters of the medical curriculum with a minimum average of 4.0. Such students will not be eligible for the master's degree until they have received the Doctor of Medicine degree. Clinical work carries no graduate credit.

Courses required are four units in Medicine 493 and at least one seminar per quarter for three quarters in one of the basic sciences as follows: Anatomy 491, Bacteriology 491, Biological Chemistry 491, Pharmacology 491, Physiology 491, 492. Attendance at staff conferences and ward rounds as determined by the department is required.

The thesis must conform to standard requirements of the Graduate College and be of such merit as to warrant publication in part or in full in an acceptable scientific or clinical journal.

GRADUATE TEACHING FACULTY

Professors: HARRY F. DOWLING (Head of Department), S. HOWARD ARMSTRONG, JR., CARROLL L. BIRCH, EDMUND F. FOLEY, FORD K. HICK, ROBERT M. KARK.

Associate Professors: FREDERICK C. LENDRUM, LOUIS R. LIMARZI, MAX M. MONTGOMERY, ISADORE PILOT, BEN Z. RAPPAPORT, SOL R. ROSENTHAL, MAX SAMTER, MITCHELL A. SPELLBERG.

Assistant Professor: GEORGE G. JACKSON.

COURSES FOR GRADUATES

493. Research in Medicine. F, W, Sp, S; credit to be arranged.

OBSTETRICS AND GYNECOLOGY

The degree of Master of Science is offered in obstetrics and gynecology. Objectives in the program include the training of investigators and teachers for staff appointments at medical colleges; preparing medical graduates for future leadership in and organization of hospital staff conferences in areas where such facilities do not exist; and training medical personnel for a keener scientific approach to the practice of the specialty of obstetrics and gynecology. Clinical work carries no graduate credit.

A Doctor of Medicine degree and a reading knowledge of at least one foreign language (French or German) or an equivalent of six semester hours of credit in a language are required for admission, in addition to the regular Graduate College requirements.

Courses which must be completed as a partial requirement for the degree are at least four units in Obstetrics and Gynecology 493; Bacteri-

ology 402, 403, 404; and at least one seminar per quarter for three quarters selected from Anatomy 491, Bacteriology 491, Biological Chemistry 491, Pharmacology 491, Physiology 491, 492. Attendance at staff conferences and ward rounds may be required by the head of the department. A thesis based on an original laboratory investigative effort of such quality as to merit publication in full or in part in a standard journal devoted to obstetrics and gynecology is required.

GRADUATE TEACHING FACULTY

Professor: FREDERICK H. FALLS (Head of Department).

COURSES FOR GRADUATES

493. Research in Obstetrics and Gynecology. The course is offered for graduate students planning to specialize in obstetrics and gynecology, and particularly for those who expect to make teaching of obstetrics and gynecology part of their future professional work. F, W, Sp, S; credit to be arranged.

OPHTHALMOLOGY

The degree of Master of Science is offered in ophthalmology. This curriculum is designed for those individuals who are entering ophthalmology and who are interested in pursuing research relating to the eye. In fulfilling the requirements for the degree of Master of Science in ophthalmology, the candidate will learn not only the methods of research on a specific problem, but will apply the concepts of basic medical sciences to ocular problems. Clinical work carries no graduate credit.

The purpose of the graduate program is to encourage qualified individuals to engage in investigational phases of ophthalmology and to formalize and systematize such investigational activities.

Admission requirements include the Doctor of Medicine degree and completion of either a postgraduate course or residency in ophthalmology of at least one year. In exceptional circumstances, work toward the Master of Science degree can be done concurrently with the postgraduate or residency training but is separate and distinct from it.

Courses required of all candidates as a partial fulfillment of requirements for the degree include at least four units in Ophthalmology 493. For those who are admitted without one year of organized postgraduate basic science training, at least one seminar course each quarter for three quarters in one of the following is required: Anatomy 491, Bacteriology 491, Biological Chemistry 491, Pharmacology 491, Physiology 491, 492, Pathology 491. In individual cases other graduate courses may be required, especially in the basic medical sciences relating to the student's research problem. Attendance at conferences in clinical ophthalmology is required.

The thesis will consist of a report or original work acceptable to and approved by a thesis committee consisting of at least three members chosen

by the head of the department, at least one of these being a non-member of the Department of Ophthalmology. The thesis should be of sufficient merit to warrant publication.

GRADUATE TEACHING FACULTY

Professor: WILLIAM F. HUGHES, JR. (Head of Department).

COURSES FOR GRADUATES

493. Research in Ophthalmology. F, W, Sp, S; credit to be arranged.

ORAL SURGERY

The degree of Master of Science is offered in oral surgery. The program is designed to train teachers and investigators for staff positions in oral surgery and specialists in oral surgery.

A Doctor of Dental Surgery degree from an accredited institution is required for admission. In addition, the applicant must have completed three quarters of an organized postgraduate curriculum leading to a certificate in oral surgery offered at the University of Illinois College of Dentistry. Three units of advanced credit will be allowed toward the Master of Science degree as recognition of work included in the postgraduate curriculum.

Since all applicants can not be accommodated, the permission of the head of the department must be secured. Letters of recommendation from deans and former teachers are considered in selecting candidates.

Courses required of all candidates as a partial fulfillment of requirements for the degree include at least four units of Oral Surgery 493. Three units of advanced credit toward the degree are allowed for courses such as Anatomy 403, Histology 401, and others or their equivalents already completed in the postgraduate curriculum which is a required prerequisite to admission for graduate work. An additional two units to complete requirements for the degree are to be determined by the major adviser and may include further course work in basic science departments. A thesis on an original investigative problem is required. The student will be registered on a half-time basis in the Graduate College during his entire period of registration and will devote the other portion of his time to teaching and assisting in the department.

GRADUATE TEACHING FACULTY

Professor: BERNARD G. SARNAT (Head of Department).

COURSES FOR GRADUATES

493. Research in Oral and Maxillofacial Surgery. F, W, Sp, S; credit to be arranged.

ORTHODONTICS

The degree of Master of Science is offered in orthodontics. The program is primarily one of training for research and teaching in the basic and ap-

plied sciences in orthodontics, but it also prepares the student for a scientific approach to the conduct of the professional specialty.

All applicants must have the degree of Doctor of Dental Surgery from an accredited dental college, must meet the minimum requirements of the Graduate College, and must be approved by the departmental staff.

A minimum residence of eighteen consecutive months or two academic years is required. During the first nine months all students are classified in the postgraduate division. Those showing scholarly proficiency and research ability are admitted for the next nine months as candidates for the Master of Science degree in the Graduate College and must write an acceptable thesis on an original investigation and pass an oral examination. Students not accepted for the degree program but who successfully complete eighteen months' work without a thesis receive a certificate of proficiency in orthodontics. This professional program is not administered by the Graduate College.

Required courses for the Master of Science degree include Orthodontics 401 and at least four units in Orthodontics 493. Three units of advanced credit toward the graduate degree are allowed for completion of graduate courses pursued in the postgraduate curriculum. These include Anatomy 401 and Histology 401. Additional courses in the basic sciences or other departments may be required by the major adviser.

GRADUATE TEACHING FACULTY

Professor: ALLAN G. BRODIE (Head of Department).

Assistant Professor: MILTON B. ENGEL.

COURSES FOR GRADUATES

401. Orthodontics. An intensive seminar course covering three quarters and including the study of the phylogeny of teeth, jaws, and head, comparative anatomy and physiology of the dental apparatus, applied functional anatomy and physiology of the human masticatory mechanism, growth and development of the head skeleton and of the human dentition, both normal and abnormal, and the etiology of malocclusion and research methods pertaining to the field. F, W, Sp, S; 1 to 3 units.

493. Research in Orthodontics. Special research in fields appropriate to the major subject. F, W, Sp, S; credit to be arranged.

PATHOLOGY

The Department of Pathology offers graduate work leading to the degrees of Master of Science and Doctor of Philosophy. Graduate work in this area includes the advanced study of mechanisms of pathogenesis of functional and structural expressions of disease. It involves the utilization of the tools and research methods of the bacteriologist, biochemist, biophysicist,

pharmacologist, or physiologist. Such training is of value to those planning an academic career of research or teaching in pathology and as a minor field of study to those who are majoring in other biological sciences.

Students who wish to become competent for the practice of anatomic pathology, or clinical pathology, or of both of these specialties of medicine, should take postgraduate residency training, not graduate work.

To qualify for admission to graduate study in pathology, the applicant must be an outstanding student who has received his bachelor's degree and has completed the basic science courses, including general and special pathology, in a class A medical or dental school. In exceptional cases, students not seeking the Doctor of Medicine or Doctor of Dental Surgery degree will be admitted providing they have completed medical courses in microscopic anatomy, gross anatomy, biochemistry, and physiology, in addition to Pathology 325 or its equivalent.

Graduate students who are majoring in other biological sciences may elect pathology as a minor providing they have completed medical courses in microscopic anatomy, physiology, and biochemistry or their equivalent. Pathology 325 is required.

Required courses for the Master of Science degree include Pathology 325, 491, and at least four units in Pathology 493. Suggested courses in addition are Pathology 402 and 403. Attendance at certain staff conferences, seminars, and clinical pathologic conferences may be required.

Candidates for the degree of Doctor of Philosophy must include the following courses or their equivalent in their program of study: Anatomy 401, 402, 403, 404, 405, Biological Chemistry 301, 302, Physiology 324, 325, 326, Pathology 325, 402, 403, 491, and at least nine units in Pathology 493, or research courses in other departments.

The thesis is based ordinarily on the problem selected for investigation and the usual standards for both Master of Science and Doctor of Philosophy candidates are required. Great latitude is allowed in the choice of problems for investigation. Studies concerning any of the biological phenomena operating in health or in disease are considered suitable provided the problem is of adequate dimension, scope, and importance. Theses based on work other than that entailing experimental methods are not approved for doctoral candidates and only in exceptional instances will such theses be approved for master's candidates.

GRADUATE TEACHING FACULTY

Professors: GRANVILLE A. BENNETT (Head of Department), GEORGE M. HASS, CECIL A. KRAKOWER, SAMUEL A. LEVINSON, JOSEPH P. WEINMANN.

Associate Professors: HUBERT R. CATCHPOLE, ALEXANDER J. NEDZEL, CONRAD L. PIRANI.

Assistant Professors: SURINDAR N. BHASKAR, EARL W. CAULDWELL.

COURSES FOR GRADUATES

- 325. General and Special Pathology Including Clinical Pathology.** The basic principles of pathological processes, including tissue injury and repair, inflammation, circulatory disturbances, retrograde processes, and tissue responses to specific infectious agents and neoplasms, are considered in the first part of the course. In the latter part of the course, the disease processes affecting each organ and anatomic system are considered in greater detail. The laboratory exercises are designed to correlate and interpret the gross, microscopic, and functional changes occurring in diseased tissues. Lectures, demonstrations, quiz conferences, and laboratory. Thirteen hours each week. F, W, Sp; 1½ units. Prerequisite: Anatomy, histology, and biological chemistry; at least introductory work in bacteriology and physiology.
- 401. Experimental Pathology.** Lecture, seminar, and laboratory course in the essentials of experimental pathology. Limited to six qualified students. F; 1 unit. Prerequisite: Undergraduate courses in pathology and anatomy, including histology.
- 402. Histochemistry.** Lecture and laboratory course in methods and results of investigation in histochemistry. Fields covered depend on interests of students and may include work with inorganic substances, carbohydrates, vitamins, hormones, nucleic acids, enzymes, and amino acids. Limited to six students. Sp; 1 unit. Prerequisite: Biological chemistry and histology.
- 403. Physiological Basis of Endocrine Pathology.** Lecture and laboratory work in physiological mechanisms underlying abnormal endocrine structure and function. Limited to six qualified students to be selected after an interview. W; 1 unit. Prerequisite: Physiology, biological chemistry, and anatomy.
- 491. Pathology Seminar.** Weekly seminar covering selected fields of interest and research in pathology. F, W; ½ unit.
- 493. Individual Research and Advanced Study in Pathology.** F, W, Sp, S; credit to be arranged. Prerequisite: Approval of instructor and head of department.

PEDODONTICS

The degree of Master of Science is offered in Pedodontics. The curriculum is devised to train individuals for teaching and research positions in dental colleges and to contribute toward scientific knowledge.

In addition to the general admission requirements of the Graduate College, applicants must have a Doctor of Dental Surgery degree and must have completed three full quarters of the postgraduate curriculum in pedodontics and received a certificate before being eligible for admission. Approval of the head of the department is required since all applicants can not be accommodated.

Three units of graduate credit are allowed as advanced credit for completing the postgraduate curriculum. At least four additional units must be

earned in Pedodontics 493. Additional courses, especially those offered in basic science departments, may be required by the major adviser.

A thesis on an original problem is required.

GRADUATE TEACHING FACULTY

Professor: MAURY MASSLER (Head of Department).

COURSES FOR GRADUATES

491. Pedodontics Seminar. An intensive seminar course including all problems related to dentistry for children (physical growth, emotional growth, diet and nutrition, endocrinology, health and disease, clinical management, preventive dentistry, and restorative dentistry). Research methods and an introduction to statistics are presented during the spring quarter. F, W, Sp; ½ to 1 unit.

493. Research in Pedodontics. F, W, Sp, S; credit to be arranged.

PHARMACOGNOSY

Programs leading to the degrees of Master of Science and Doctor of Philosophy are offered in pharmacognosy and are subject to the general regulations of the Graduate College.

Of a minimum of nine units required for the degree of Master of Science, a minimum of four units of research credit in the major field is required. Of the minimum of eighteen units necessary for the degree of Doctor of Philosophy, not less than nine units must be devoted to research and not less than ten units to formal course study (including formal courses credited toward the master's degree). Such minimal programs are accepted in the exceptional case, rather than as a general rule.

Prerequisites for admission, in addition to the general requirements of the Graduate College, include a degree of Bachelor of Science in pharmacy from an accredited institution. Candidates for training beyond the master's level shall have completed the Master of Science degree in this Graduate College, except where, in the opinion of the department head, work of equivalent value has been completed elsewhere.

The student must show evidence of undergraduate training adequate to the program projected in the Graduate College. Additional or repeated undergraduate courses may be required, without graduate credit, to complete the necessary background. Such courses must be completed before or during the first year of graduate study.

Facilities for teaching and research in this department are offered to qualified students in three principal categories: (1) students majoring in pharmacognosy; (2) major students from other fields electing minor study in pharmacognosy; and (3) graduate students, upon the recommendation of their director, seeking courses in this department as adjuncts to their major and minor programs in other fields.

Qualified candidates for graduate training in this department should confer with the appropriate members of the graduate faculty for the purpose of evaluating needs and objectives.

The following courses are required of all students seeking advanced degrees in pharmacognosy: Pharmacognosy 301, 302, and 491. Candidates for the degree of Master of Science must have completed not less than one unit and candidates for the Doctor of Philosophy not less than two units from the following group: Pharmacognosy 303, 304, 314.

Additional courses needed to complete the major program in pharmacognosy may be elected or assigned from the above groups or from the following: Pharmacognosy 306, 401, 405, 493.

Supporting programs including such courses or minors may be chosen from the following: Biological Chemistry 301, 302, Chemistry (Pharmaceutical) 303, 304, 409, 410, Pharmacology 325, 326, 491, 493, Bacteriology 401, 402, 403, 404. Other courses may be elected with the approval of the major adviser.

GRADUATE TEACHING FACULTY

Associate Professor: RALPH F. VOIGT.

Assistant Professors: CONRAD A. BLOMQUIST, FRANK CRANE, CHARLES A. REED.

COURSES FOR GRADUATES

301. **Plant Anatomy.** A microscopic study of the structure of vascular plants, with particular attention to the development and evaluation of the vascular systems in all parts of the plant. Two lectures and two three-hour laboratory periods each week. W; 1 unit.
302. **Plant Physiology.** A study of life processes in plants, with particular attention to the cell as the fundamental functional unit. The basic principles of plant metabolism are emphasized in relation to essential elements, energy relationships, and other environmental factors. Three lectures or conferences and two three-hour laboratory periods each week. Sp; 1 unit. Prerequisite: Pharmacognosy 301.
303. **Systematic Pharmacognosy.** A taxonomic study of the flowering plants, with particular emphasis upon those of drug import. Relationship of the principal orders and families, rules of nomenclature, and systems of classification will be considered. Laboratory work includes identification of species, together with the collection, identification, and preservation of drug plant specimens. Two lectures and three three-hour laboratory periods each week. F or Sp; 1 unit.
304. **Genetics.** A consideration of the fundamental principles of biological inheritance, and the application of these in the study of plant and animal life. Three lectures and two three-hour laboratory periods each week. F or W; 1 unit.
306. **Pharmacognosy of the Allergens.** An atmospheric survey and study of the wind-borne pollen and fungi spores; the identification and distribution of

hay fever plants and the practical application of these studies. Two lectures and one three-hour laboratory period each week. Sp, S; $\frac{1}{2}$ to 1 unit.

314. **Histological Technics.** A theoretical and practical development of the knowledge and skills essential to the preparation of biological materials for microscopic study. One lecture and two three-hour laboratory periods each week. F or W; $\frac{1}{2}$ unit.
316. **Commercial Pharmacognosy.** A study of the traffic in crude drugs and related products, with a consideration of the basic principles governing the production, distribution, and consumption of these materials. Three lectures or conferences each week. F; $\frac{1}{2}$ unit.
401. **Drug Plant Cultivation.** A consideration of the principles involved in the propagation and care of drug plants, combined with practical applications at the Drug Plant Experiment Station. Attention is given to the principles and practices of harvesting, preparation, storage, and marketing. Two lectures and three three-hour laboratory periods each week. Sp or S; 1 unit.
405. **Quantitative Pharmacognosy.** The use of quantitative methods and a study of their application in the macroscopic and microscopic evaluation of drugs, including the development of new methods. One lecture and two three-hour laboratory periods each week. W; $\frac{1}{2}$ unit.
491. **Pharmacognosy Seminar.** Reviews, reports, and discussions covering the latest advances in pharmacognosy, phytochemistry, genetics, and other related subjects. F, W, or Sp; $\frac{1}{2}$ unit.
493. **Research in Pharmacognosy.** Problems may be selected in any division of pharmacognosy including histological pharmacognosy, microchemical pharmacognosy, the chemistry of drug constituents, the standardization of drugs, drug plant cultivation and breeding or food microscopy. F, W, Sp, S; credit to be arranged.

PHARMACOLOGY

A program leading to the Master of Science and Doctor of Philosophy degrees is offered in the Department of Pharmacology. The curriculum is designed to train candidates for medical school teaching and for research in universities, industry, and governmental laboratories. Courses of study may be arranged to concentrate in one or more of the following subdivisions of pharmacology: toxicology, pharmacodynamics, chemotherapy, or neuropharmacology.

Preference is given to applicants who have completed a major in biological sciences or chemistry in undergraduate courses, and who show evidence of a sincere desire for a teaching and research career in the medical sciences.

Candidates for the degree of Master of Science are required to complete Pharmacology 325, 326, at least four units in Pharmacology 493, and three units from those courses in the catalog of the Graduate College, other than seminars or research, listed under the department headings of Anatomy,

Bacteriology, Biological Chemistry, Chemistry (Pharmaceutical), Pathology, and Physiology.

Candidates who have completed Biological Chemistry 301, 302, Physiology 324, 325, 326, and Pharmacology 325, 326, or their equivalent, before registering in the Graduate College, may meet the requirements for the degree of Master of Science entirely from courses 491 and 493, but it is suggested that with the counsel of the adviser and head of the department several correlative courses be taken. The thesis for a master's degree must be of such quality as to merit publication in a recognized scientific journal.

Candidates for the degree of Doctor of Philosophy are required to complete Pharmacology 325, 326, and to earn a minimum of nine units in Pharmacology 493 and five units in courses other than those earned in the minor. The latter may be taken in one or more of the following: anatomy, bacteriology, biological chemistry, chemistry (pharmaceutical), pathology, or physiology. The selection is to be made on advice of the adviser and the head of the department. A suitable course or a proven working knowledge of biometrics is required of all candidates for the doctor's degree. The thesis for the doctorate should be of such merit as to warrant publication in part or in full in a recognized scientific journal.

GRADUATE TEACHING FACULTY

Professors: CARL C. PFEIFFER (Head of Department), WALTER J. R. CAMP, KLAUS R. W. UNNA.

Associate Professors: JAMES A. BAIN, THEODORE R. SIERREROD.

COURSES FOR GRADUATES

325. **Pharmacology, Toxicology, and Chemotherapy.** Lectures and quizzes; one three-hour laboratory period each week. W; $\frac{3}{4}$ unit.
326. **Pharmacology, Toxicology, and Chemotherapy.** Continuation of Pharmacology 325. Lectures and quizzes; one two-hour demonstration each week. Sp; $\frac{3}{4}$ unit.
491. **Pharmacological Seminar.** Weekly seminar. Presentation of original research in pharmacology, toxicology, and chemotherapy. F, W, Sp, S; $\frac{1}{2}$ unit.
493. **Research.** Supervised research in pharmacodynamics, neuropharmacology, toxicology, and chemotherapy. F, W, Sp, S; credit to be arranged.

PHARMACY

The degree of Master of Science is offered in the Department of Pharmacy. Prospective students must have completed a bachelor's degree in an accredited college of pharmacy or a degree in some other area and be currently in pursuit of a bachelor's degree in pharmacy. The usual requirements of the Graduate College regarding undergraduate scholastic average are enforced.

Required work must include four units in Pharmacy 493 and additional units in other course offerings in the department. Supporting courses in chemistry, pharmacology, bacteriology, and other areas may be required of the individual student by his major adviser.

A thesis on an original investigation is required.

GRADUATE TEACHING FACULTY

Professors: EARL R. SERLES (Head of Department), DWIGHT L. DEARDORFF.

COURSES FOR GRADUATES

- 400. Hospital Pharmacy.** Study and practice of the administrative and operational aspects of hospital pharmacies. One lecture and nine hours practice each week. F; 1 unit.
- 402. Manufacturing Pharmacy.** Lectures and laboratory work on the unit processes and equipment used in the preparation of pharmaceutical preparations. One lecture and nine hours practice each week. F, W, Sp; 1 unit each quarter for not more than three quarters.
- 491. Seminar in Pharmacy.** Presentation of individual research contributions and of topics related to pharmacy. Each student is assigned a subject for presentation during the quarter. F, W, Sp; ½ unit each quarter for not more than two quarters.
- 493. Research in Pharmacy.** F, W, Sp, S; credit to be arranged.

PHYSICAL MEDICINE AND REHABILITATION

The offering of a degree of Master of Science in physical medicine and rehabilitation has been discontinued for the period covered by the present catalog.

PHYSIOLOGY

The graduate program in physiology leads to the Master of Science and Doctor of Philosophy degrees. The curriculum is aimed at the education of candidates for careers in teaching and research primarily in relation to colleges of medicine, dentistry, and pharmacy, and for appointments to positions in governmental and industrial institutions and laboratories. Through the graduate program of the department, present and future medical practitioners may receive educational and research experience which is invaluable to sound medical practice and is usually unavailable in the regular undergraduate curricula.

Applicants who have a Doctor of Medicine or Doctor of Dental Surgery degree or who have completed the first two years of the undergraduate medical or dental curriculum with a bachelor's degree are given preference. Students with a bachelor's degree who have completed premedical requirements and fulfilled the general requirements of the Graduate College are also accepted.

The course requirements for the Master of Science degree are Biological Chemistry 301, 302 (or equivalent), Physiology 324, 325, 326 (or equivalent), Physiology 491, and at least four units of research in Physiology 493. Applicants with a Doctor of Medicine or Doctor of Dental Surgery degree and students who have completed two years of the undergraduate medical or dental curriculum will have satisfied the course requirements of Biological Chemistry 301, 302, and Physiology 324, 325, 326. In individual instances, one or more of the following courses may be required: Public Health 401, Physiology 492, Anatomy 404, 405.

For the Doctor of Philosophy degree, course requirements in addition to those for the master's degree are Anatomy 404, 405, 407, Public Health 401, one and one-half units each in Physiology 491 and 492, and at least nine units in Physiology 493 (in addition to those credited toward the Master of Science degree). The minor requirement of four units may be satisfied in anatomy, bacteriology, biological chemistry, pathology, and pharmacology, or occasionally in other departments. Conferences and seminars in other departments may be required by the major adviser in addition to specifically listed courses. A thesis of sufficient merit to warrant publication in whole or in part in a recognized physiological or related journal is required.

GRADUATE TEACHING FACULTY

Professors: GEORGE E. WAKERLIN (Head of Department), ALBERT BACHEM, VICTOR GUILLEMIN, CARLOS I. REED.

Associate Professors: RAYMOND C. INGRAHAM, JOHN P. MARBARGER, ALFRED A. SCHILLER, WILLIAM V. WHITEHORN.

Lecturers: HAROLD E. HIMWICH, WILLIAM S. HOFFMAN.

COURSES FOR GRADUATES

301. Biophysics. This course presents physical principles, techniques, and instrumentation applicable to biological and medical research, clinical diagnosis, and therapy. Topics are selected from the following branches of physics: mechanics, sound, heat and thermodynamics, electricity, and electronics. The course is offered in collaboration with the Department of Chemistry of the College of Pharmacy and the Department of Radiology. Lectures, conferences, and demonstrations. W; ½ unit.

302. Biophysics. Continuation of Physiology 301. Sp; ½ unit.

324. Human Physiology. Physiology of blood, circulation, and respiration. Lectures, conferences, demonstrations, and laboratory. Sp; 1 unit. Prerequisite: Biological Chemistry 301 and 302.

325. Human Physiology. Continuation of Physiology 324. Physiology of digestion, excretion, endocrines, nutrition, metabolism, and heat regulation. Lectures, conferences, demonstrations, and laboratory. F; 1 unit. Prerequisite: Physiology 324.

- 326. Human Physiology.** Continuation of Physiology 325. Physiology of muscle and nerve, central nervous system, and senses. Lectures, conferences, demonstrations, and laboratory. W; 1 unit. Prerequisite: Physiology 325.
- 401. Advanced Physiology of the Endocrines.** The symptomatology, diagnosis, and therapy of hypofunction, hyperfunction, and dysfunction of the glands of internal secretion, as illustrated by appropriate ablation and other experiments on animals and by observations on suitable endocrinopathies. Lectures, conferences, demonstrations, and laboratory. F, W, Sp, or S; ½ unit. Prerequisite: Physiology 324, 325, 326, or equivalent and/or consent of instructor.
- 402. Advanced Cardiovascular Physiology.** A course designed to provide advanced graduate students an opportunity to study and utilize experimental procedures that are basic in cardiovascular research. Emphasis is given to modern methods and instrumentation. Lectures, conferences, demonstrations, and laboratory. F, W, Sp, or S; 1 unit. Prerequisite: Physiology 324, 325, 326, or equivalent and/or consent of instructor.
- 491. Physiology Seminar.** F, W, Sp; ½ unit. Prerequisite: Credit or registration in Physiology 324, 325, and 326.
- 492. Seminar in Selected Fields of Physiology.** This course is designed to meet the needs of students desiring advanced detailed knowledge of a limited field of physiology. Different fields are selected and announced in advance. Subjects are: blood, heart, circulation, muscle, gastrointestinal tract, kidney, endocrinology, metabolism and nutrition, growth and neurophysiology. F, W, Sp, or S; ½ unit. Prerequisite: Credit or registration in Physiology 324, 325, and 326.
- 493. Research in Physiology.** F, W, Sp, S; credit to be arranged. Prerequisite: Credit or registration in Physiology 324, 325, and 326.

PHYSIOLOGY (CLINICAL SCIENCE)

The graduate program of the Department of Clinical Science is integrated with the undergraduate and research programs to achieve the following objectives: (1) to advance the science of medicine by contributing new knowledge and methods; (2) to train physicians in the application of basic science to the practice of medicine; and (3) to train persons seeking a career in medical research and teaching in the basic medical sciences. Programs of the department lead to Master of Science and Doctor of Philosophy degrees in physiology.

The department has many more applicants than it can accommodate. The minimal requirements are: (1) the Doctor of Medicine or Doctor of Dental Surgery degree; or (2) completion of the first two years of medical school; or (3) the bachelor's degree and completion of the premedical program.

The program for the Master of Science degree depends upon the background of the candidate. If a student has the Doctor of Medicine or Doctor

of Dental Surgery degree or has completed the first two years of medical school, the only course requirement is the departmental seminar, course 491. The remainder of the program consists of research in course 493. Students who do not have the Doctor of Medicine or Doctor of Dental Surgery degree or have not completed the first two years of medical school are required to take, in addition to the seminar course, Physiology 324, 325, 326 (Human Physiology), and Biological Chemistry 301, 302. In individual instances recommendations are made concerning courses in anatomy, pathology, bacteriology, and pharmacology.

The submission of a thesis covering original investigation completed by the candidate is required.

Admission of students for work toward the Doctor of Philosophy degree is subject to the general requirements of the Graduate College stated in the forepart of this catalog. A student must have completed work toward the master's degree and fulfilled the requirements of the committee appointed to conduct the applicant's qualifying examination.

Candidates for the Doctor of Philosophy degree who do not have the Doctor of Medicine or Doctor of Dental Surgery degree or have not completed the first two years of medical school must take Anatomy 404, 405, 407, Public Health 401, and Clinical Science 401, 491 in addition to the courses required in the Master of Science program. The minor requirement of four units of work may be satisfied in any one of the departments of Anatomy, Bacteriology, Biological Chemistry, Pathology, Pharmacology, or exceptionally in other departments. The following seminar courses are recommended: Anatomy 491, Bacteriology 491, Biological Chemistry 491, Pharmacology 491, Physiology 491, 492, and Pathology 491.

Attendance at student-staff conferences in medicine, pediatrics, and neurophysiology may be required by the major adviser.

The usual thesis requirement of the Graduate College must be complied with by each candidate for the degree.

GRADUATE TEACHING FACULTY

Professor: ANDREW C. IVY (Head of Department of Clinical Science).

COURSES FOR GRADUATES

- 401. **Advanced Physiology of the Digestive System.** This course is designed for graduate students who desire to obtain special training for research on the alimentary tract. W; 1 unit. Prerequisite: Comparative anatomy, physiology, pharmacology, biological chemistry.
- 491. **Seminar in Clinical Science.** F, Sp, S; ½ unit. Prerequisite: Comparative anatomy.
- 493. **Research in Clinical Science.** F, W, Sp, S; credit to be arranged. Prerequisite: Credit or registration in Physiology 324, 325, 326.

PSYCHIATRY

Graduate degrees are not granted in psychiatry, but graduate students may take course offerings in the department and apply the credit toward graduate degrees in a basic science department. Students pursuing work in the field of neurophysiology, for example, must fulfill the curriculum requirements for graduate degrees in physiology but may pursue course work or research in psychiatry toward the development of a suitable thesis. A curriculum leading to graduate degrees in psychology is not offered although certain courses of a clinical nature may be made available, by arrangement, for psychology graduate students on the Urbana campus and at other colleges and universities. Students are required to register for a full program of work which includes courses 480-3, 491, 493, 494, 495.

GRADUATE TEACHING FACULTY

Professors: FRANCIS J. GERTY (Head of Department), HUGH T. CARMICHAEL, RALPH W. GERARD, ANN MAGARET, LADISLAS J. MEDUNA, DAVID SHAKOW.
Assistant Professors: LEO G. ABOOD,¹ PAUL E. NIELSON.

COURSES FOR GRADUATES

- 480-3. Practicum in Clinical Psychology.** This full-time four-quarter program is designed to provide the third year of training of the four-year doctoral program in clinical psychology approved by the American Psychological Association. Intensive supervised practice and research is provided. F, W, Sp, S; 2 units per quarter. Prerequisite: Two years of graduate work in clinical psychology.
- 491. Seminar in Psychiatry and Psychology.** A seminar centered primarily around the consideration of research and theoretical problems growing out of the day-to-day clinical activities. Students report on such topics as the experimental design of projects directed at answering questions arising from their case studies or following up the theoretical implications of the findings in individual cases. F, W, Sp, S; ½ unit.
- 493. Research in Psychiatry.** Investigation of problems concerning psychiatry through laboratory, clinical, and sociological approaches; neuroanatomical, neurophysiological, biochemical, and psychological means are employed to throw light on the clinical problems of etiology, diagnosis, prevention, and treatment of behavioral disorders in man. The chief object is the exploration of the foundations of psychiatry rather than the apparent promise of practical application of results. F, W, Sp, S; credit to be arranged. Prerequisite: Medical degree, student in medical curriculum, adequate preparation in an ancillary or related field — physiology, psychology, psychiatric social work.

¹ Approved as adviser for Master of Science candidates in the Department of Biological Chemistry.

- 494. Research in Child Psychiatry.** Research on some particular aspect of child behavior, either in terms of etiology, symptomatology, or treatment, or a combination of these. F, W, Sp, S; credit to be arranged. Prerequisite: Psychological or psychiatric training.
- 495. Research in Psychology.** Research under the sponsorship of the staff members in the Division of Psychology. F, W, Sp, S; credit to be arranged.

PUBLIC HEALTH

Graduate programs are not conducted in this discipline. Students registered for graduate work in basic sciences and other departments may take advantage of the courses offered in this department.

GRADUATE TEACHING FACULTY

Professors: HOWARD J. SHAUGHNESSY (Head of Department), HERBERT C. BATSON.

COURSES FOR GRADUATES

- 401. Biometrics and Applied Statistics.** This course is designed as an introduction to the rational use of simple statistical methods in the planning of experiments and evaluation of results. S; 1 unit.

RADIOLOGY

The graduate curriculum in radiology leads to the Master of Science degree. Graduate work in the field of radiology is provided for the purpose of stimulating the development of critical investigators and intelligent teachers in this rapidly developing field. The plan involves training the student in the techniques indicating the course of the investigation and evaluating changes in the methods and results. Facilities are available for research on monochromatic and high intensity soft radiations and on the betatron in its relationship to applied physics and radiobiology.

For majors in the department the Doctor of Medicine or Doctor of Dental Surgery degree is required with the exception that undergraduate students may be accepted on a selective basis if they are pursuing work toward the Doctor of Medicine degree and meet the general admission requirements of the Graduate College. The Master of Science degree will not be awarded before completion of requirements for the Doctor of Medicine degree.

Courses required of all candidates are at least four units in Radiology 493 and at least one seminar in a basic science per quarter for three quarters. Attendance is also required at conferences and seminars and at the radiation physics course of thirty-six hours offered jointly by the Department of Radiology and the Cook County Graduate School. Attendance at additional conferences may be required by the department head.

The thesis requirement is the usual standard requirement of the Graduate College and must be based on an original investigation of a suitable problem.

GRADUATE TEACHING FACULTY

Professor: ROGER A. HARVEY (Head of Department).

Assistant Professor: WALTER S. MOOS.

COURSES FOR GRADUATES

493. **Research in Radiology.** Research in the physical and biological aspects of radiography and radiotherapy using such instruments as monochromatic radiations, high intensity radiations, radioactive isotopes, and the betatron. F, W, Sp, S; credit to be arranged.

SURGERY

Graduate training in surgery leads to the Master of Science and Doctor of Philosophy degrees and is designed primarily to encourage the value of basic science research in surgical problems, such as complications in post-operative care and malnutrition in surgical diseases which are ordinarily the major concern of a surgeon's work. The art of surgery which pertains to surgical technique has no place in the program of candidates for the Master of Science degree. The candidate for the degree of Doctor of Philosophy must devote the major portion of his time to research but must also become exposed to the art of surgical technique, though the time so devoted shall not apply toward residence requirements or unit values in the Graduate College. Work in the basic sciences is essential for a well-trained scientific surgeon, but this work alone is not sufficient to qualify a candidate for a Doctor of Philosophy degree in surgery. While he might be able to solve problems in surgical disease utilizing fundamental knowledge of physiology or biological chemistry, he must also be cognizant of potential problems in preoperative and postoperative care and surgical convalescence, which knowledge can not be achieved by a pursuit of basic sciences alone.

A Doctor of Medicine degree is required for admission with the exception that medical students who have completed two years of the medical curriculum may apply for graduate work toward a Master of Science degree if they fulfill the general requirements for admission to the Graduate College. The latter class of candidates will not be granted a graduate degree in surgery until they have completed requirements for the Doctor of Medicine degree.

A minor is not required for the master's degree, but candidates are encouraged to pursue basic science course work whenever possible. Registration in at least one seminar course per quarter for three quarters is required in the following offerings: Anatomy 491, Biological Chemistry 491, Clinical Science 491, Bacteriology 491, Pharmacology 491, Physiology 491, 492, and Pathology 491. In addition, the candidate is expected to attend one additional basic science seminar each week though he need not register for it. Attendance at surgical pathological conferences, journal club, ward rounds and clinics, and surgical research seminars is required.

An applicant for the Doctor of Philosophy degree must fulfill the general admission requirements of the Graduate College. He must choose a minor in one of the basic sciences, and a graduate faculty member in the basic science department shall be the co-adviser with the candidate's major adviser on his research work and thesis. He must attend two seminars per quarter for six quarters in the departments specified above for Master of Science candidates.

GRADUATE TEACHING FACULTY

Professors: WARREN H. COLE (Head of Department), EDWIN M. MILLER, CHARLES B. PUESTOW, MAX S. SADOVE.

Associate Professors: GÉZA DE TAKATS, RUSSELL D. HERROLD.

Assistant Professor: CARL B. DAVIS, JR.

COURSES FOR GRADUATES

491. **Surgical Seminar.** Discussion of research problems and methods of their execution, review of important literature related to research in progress, presentation of research data, and discussion of recent advances in surgical research. F, W, Sp, S; ½ unit. Prerequisite: Doctor of Medicine degree, or undergraduate medical students enrolled in Graduate College.
493. **Research in Surgery.** Investigation of problems in surgery, including laboratory and clinical work. F, W, Sp, S; credit to be arranged.

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